

73 Amateur Radio Today

**Taming the
Wild Junk Box**

**Easy-Build
Project:**

- AC Line Filter

Remembering:

- *Titanic*
- Tesla

**Maldives
Adventure**

**Window
Dressing
For Your
Vee-hickle**

**Inside
Mt. Wilson**

APRIL 2002
ISSUE #497
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Are You Prepared?

Every radio enthusiast should own at least one scanning receiver. Alinco offers four great choices!

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Here are some of the activities you can monitor: Shortwave, commercial AM & FM broadcasts, Ham radio, police, auto racing communications, fire, security, medical, FRS, GMRS, CB, maritime, weather, news media, railways, military, aircraft control, service industries, search & rescue operations and much more!



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Feedback - Product Reviews
73 Amateur Radio Today Magazine
70 Hancock Rd.
Peterborough NH 03458-1107
603-924-0058
Fax: 603-924-8613

Reprints: \$3 per article
Back issues: \$5 each

Printed in the USA

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APRIL 2002
ISSUE #497

THE NEW! 73 Amateur Radio Today

TABLE OF CONTENTS

FEATURES

10 **Ham Window Dressing — Rynone**
If this nifty car frequency display doesn't draw gawks, nothing ever will.

14 **SOS ... SOS ... Titanic! — Garcia**
Radio operators' courage still inspires amateurs.

19 **Does Your Junk Box Runneth Over? — W6WTU**
A true junkie explains how to get a grip.

22 **New Life for a Pierson KE-93 — W6WTU**
Part 3 of 3.

25 **The Call of the Maldives — G3SWH**
8Q7WH, that is ...

29 **Easy-Build Project of the Month — K8IHQ**
This time: 400 kHz AC low pass filter for 120 VAC 60 Hz line filtering.

31 **Tesla: Inventor of Radio and Modern Day AC — Brand, Watts, & W8AHB**
(Marconi & Edison notwithstanding.)

38 **Mt. Wilson Travelogue — W6WTU**
Join this private tour of one of America's most famous observatories.

DEPARTMENTS

49 **Ad Index**
64 **Barter 'n' Buy**
43 **Calendar Events**
46 **The Digital Port — KB7NO**
44 **Hamsats — W5ACM**
52 **Homing In — K0OV**
8 **Letters**
4 **Never Say Die — W2NSD/1**
48 **New Products**
51 **On the Go — KE8YN/0**
60 **Propagation — Gray**
1 **QRX**
63 **Radio Bookshop**

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QRX . . .

Yikes! It's Another RECOUNT!

Unfortunately, some dark news now follows the good news on ham radio growth patterns recently reported. Now it seems that the numbers may not be as good as thought.

Fred Maia W5YI, who follows growth trends in ham radio, says that the numbers were overly optimistic:

"The FCC database is a database of all amateurs who have been licensed for 12 years. That's ten years for the license term and an additional two. The reason it stays in the database for the additional two is so that

it can be renewed during the grace period. Therefore, the licenses in the database are two years more than the ten-year term, or twenty percent inflated."

According to Fred, as of January 15, 2002, there were actually only 98,030 holders of the Extra class license; 86,425 legacy Advanced; 138,546 Generals; 318,603 Technicians and legacy Tech-plus; and only 39,972 Novice class. The total is 681,576. That is considerably lower than the 720,194 reported in the latest QRZ census and 10,424 lower than the adjusted 692,000 that others believed to be accurate.

The bottom line: Once you take away the expired

Continued on page 6

73 Amateur Radio Today (ISSN 1052-2522) is published monthly by 73 Magazine, 70 Hancock Rd., Peterborough NH 03458-1107. The entire contents ©2002 by 73 Magazine. No part of this publication may be reproduced without written permission of the publisher, which is not all that difficult to get. The subscription rate is: one year \$24.97, two years \$44.97; Canada: one year \$34.21, two years \$57.75, including postage and 7% GST. Foreign postage: \$19 surface, \$42 airmail additional per year, payable in US funds on a US bank. Second class postage is paid at Peterborough, NH, and at additional mailing offices. Canadian second class mail registration #178101. Canadian GST registration #125393314. Microfilm edition: University Microfilm, Ann Arbor MI 48106. POSTMASTER: Send address changes to 73 Amateur Radio Today, 70 Hancock Rd., Peterborough NH 03458-1107. 73 Amateur Radio Today is owned by Shabromat Way Ltd. of Hancock NH.



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SS-25	20	25	2½ x 7 x 9½	4.2
SS-30	25	30	3½ x 7 x 9½	5.0

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2½ x 7 x 9½	4.2
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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9½	6.5
SRM-30M	25	30	3½ x 19 x 9½	7.0

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9½	10.5
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WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
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SS-18GX
SS-12EFJ
SS-18EFJ
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SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-12SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V



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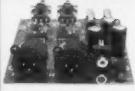


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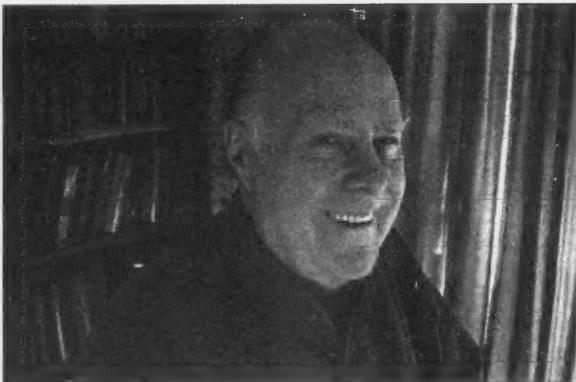
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Action!

We've got a problem and we damned well better do something about it! What's the problem? Our hobby is heading toward extinction ... and we aren't doing anything about it. And by "we" I mean *you*, as well as your very distinguished ARRL HQ gang and the Board of Directors.

With about 80% of our licensees inactive and newcomers down to a dribble, our future right now looks bleak.

But gee, I hear you mumble, what can *I* do about something like that? What you can do is get your big fat bew-tox into gear. Yes, of course I have a plan, and I think you'll like it.

Okay, problem #1: We need to get kids interested in ham radio. We need new blood, and a lot of it. Now, how are we going to do that? That's easy, we're going to start promoting the fun and excitement amateur radio provides. We're going to get visible. As long as kids don't even know the hobby exists, we aren't going to be able to infect them with hamitis. That's the affliction I caught when I was 15 and have never been able to shake off.

Yes, I know all about the Internet and kids. But kids have always had a lot of interesting options.

We need to turn every ham club in the country into a propaganda mill promoting the hobby.

Before you roll over, yawning, for a little nap, let me explain why this is important. No matter how much isolationists want to cut America

off from the rest of the world, developing communications and transportation technologies are going to make this a one world society in the long run. And this means that if we're going to maintain our standard of living, our workforce is going to have to be competitive.

If we're going to be successful, we're going to have to have the best-educated workers in the world. Right now we sure don't. We've been coasting along on our past, watching one industry after another slip offshore. We're seeing the blue-collar jobs moving to Mexico, China, and other lower-wage countries.

So where does ham radio fit into this? It's a great way to get kids interested in learning about technology. We need to get them aboard and then get them interested in learning about our ham satellites, packet, and our other pioneering activities. We don't need more shoe salesmen, we need engineers and technicians to design, build, sell, install, and service high-tech (high profit) gear.

Step by Step

Let's start by building our propaganda barrage. Now I'm talking to you! I've had an almost endless number of exciting and fun adventures involving the hobby ... and I write about them in my essays. How about *you*? When are you going to sit down at your word processor and tell me about a ham-related adventure you've had? I'd love to be able to run a section of

the magazine with these stories. And then reprint them in a booklet ham clubs can use to give to prospective hams. A booklet just about my adventures isn't going to do the job ... even though I could fill a whole book with them.

Dubya at the Korean DMZ reminded me of when I visited there and got on the air for a few hours with one foot in each of the Koreas, talking with friends all around the world. What a kick that was!

What are some of the fun things you've done with the hobby? Tell me about them.

Once we have some solid propaganda to lay on the kids, we have to reach them. That's not as hard as you probably think. The idea of being able to keep in touch with friends via a local repeater will get them excited. That's better than their cell phones. Being able to talk with people anywhere in the world is another big plus.

My many 20m contacts with Robbie 5Z4ERR in Nairobi got me to organize a ham hunting safari, not one minute of which will I ever forget.

Sure, I've done my share of totally forgettable 75m round tables. I've made thousands of "the rig here is" short contacts. Most of the 350 or so countries I've confirmed were contacts that lasted less than a minute. Done all that. They're not what stands out for me. My OSCAR contact with Moscow, where we had a 20-second window ... that stands out. My sitting up all night operating with King Hussein. My two DXpeditions to Navassa. The contest when I worked a

hundred countries in one weekend. The night I worked all 50 states on 75m ... just to see if I could do it.

Sorry, but the stories of my exciting ham adventures can go on for hours. What I need are yours, not mine.

If you haven't had any exciting ham adventures, maybe it's time to get unstuck and have some. The opportunities are there, just grab them.

Have you sent any rigs up in balloons? Rockets? Operated from some weird place? Helped in an emergency? Have you operated from a hot air balloon? Have I told you recently about the time I did that while ballooning over the South African veldt? Or, in the early repeater days, when I made 2m contacts while flying across the country on commercial airlines? Yes, with the permission of the pilot.

A More Immediate Problem

If you've been watching *60 Minutes* and other programs of its ilk, you know that thousands of terrorists have infiltrated our country, all awaiting orders on how to do big-time harm. They've been taking flying lessons, scoping out the crop duster planes, obviously with the goal of spreading something we really don't want spread. I somehow doubt that they've been doing this just to make us nervous.

What that means is that there's a good chance our ability to set up emergency

Continued on page 7

Big Savings on Radio Scanners

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Bearcat® 780XLT Trunk Tracker III

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500 Channels • 10 banks • CTCSS/DCS • S Meter

Size: 7^{5/8"} Wide x 6^{15/16"} Deep x 2^{13/16"} High

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The Bearcat 780XLT has 500 channels and the widest frequency coverage of any Bearcat scanner ever. Packed with features such as Trunktracker III to cover EDACS, Motorola and EF Johnson systems, control channel only mode to allow you to automatically trunk certain systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display & backlight controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMBBCN for \$29.95; The BC780XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com.

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300 Channels • 10 banks • Built-in CTCSS • S Meter

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868.995 MHz, 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for the entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery.

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continued from page 1

licenses that are in their grace renewal period, the club and military recreation stations and the like, the numbers are not nearly as rosy as people thought.

Thanks to Newsline, Bill Pasternak WA6ITF, editor.

Would That Be Dubya 4?

President George W. Bush has taken to the ham radio airwaves. This, to thank the Florida Amateur Radio community for being ready to serve the public when it is needed.

The president's comments were made during a stopover the morning of January 31st at the Volusia County Fire Services and Training Center near Daytona. Around 9:15 a.m. Eastern Time, President Bush checked in to the Northern Florida Amateur Radio Emergency Service Net on 3.950 MHz, using a portable station set up by John Schmidt AF4PU. Then the president made these remarks to the 40 or so stations listening to the net:

"I want to thank all the volunteers who help make sure that Florida is prepared for any kind of emergency. I also want to assure you that your federal government is doing everything we can to make sure that there is not an emergency — starting with unleashing the mighty U.S. military overseas to bring evil ones to justice. But should there be a need for a response, I want to thank you all for helping our communities be prepared. And finally, I want to tell you — we are lucky to be Americans and may God continue to bless this great land of ours. Thank you very much."

Needless to say, the net members were delighted to have the president of the United States address them. More important, hams nationwide can now be sure that President Bush knows that amateur radio operators are ready to serve whenever he, and the nation, needs to call on them for help.

Thanks to Bill Burnett KT4SB, via Newsline, Bill Pasternak WA6ITF, editor.

The ABCs of Friendship

A friend ...

- (A)cccepts you as you are.
- (B)elieves in "you."
- (C)alls you just to say "Hi."
- (D)oesn't give up on you.
- (E)visions the whole of you (even the unfinished parts).
- (F)orgives your mistakes.
- (G)ives unconditionally.
- (H)elps you.
- (I)nvites you over.
- (J)ust wants to "be" with you.
- (K)eeps you close at heart.
- (L)oves you for who you are.

- (M)akes a difference in your life.
- (N)ever judges.
- (O)ffers support.
- (P)icks you up.
- (Q)uiets your fears.
- (R)aises your spirits.
- (S)says nice things about you.
- (T)ells you the truth when you need to hear it.
- (U)nderstands you.
- (V)alues you.
- (W)alks beside you.
- (X)plains things you don't understand.
- (Y)ells when you won't listen, and
- (Z)aps you back to reality.

Thanks to the Warrensburg (MO) Area ARC's The Repeater, June 13, 1998.

New Element Discovered

The heaviest element known to science was recently discovered by government research physicists. The element, tentatively named Administratium, has no protons or electrons and thus has an atomic number of 0 (zero). However, it does have one neutron, 125 assistant neutrons, 75 vice neutrons, and 111 assistant vice neutrons. This gives it an atomic number of 312. These 312 particles are held together by a force that involves the continuous exchange of meson-like particles called morons.

Since it has no electrons, Administratium is inert. However, it can be detected chemically as it impedes every reaction that it comes in contact with. According to the discoverers, a minute amount of Administratium caused one reaction to take over four days to complete when it would have normally occurred in less than one second. Administratium has a normal half-life of approximately three years, at which time it does not actually decay but instead undergoes a re-organization in which assistant neutrons, vice neutrons, and assistant vice neutrons exchange places. Some studies have shown that the atomic mass actually increases after each reorganization.

Research at other laboratories indicates that Administratium occurs naturally in the atmosphere. It tends to concentrate at certain points such as government agencies, large corporations, and universities, and can usually be found in the newest, best appointed, and best maintained buildings.

Scientists point out that Administratium is known to be toxic at any detectable level of concentration and can easily destroy any productive reaction where it is allowed to accumulate. Attempts are being made to determine how Administratium can be controlled to prevent irreversible damage, but results to date are not promising.

Thanks to the July-August 1999 edition of the *Static*, the newsletter of the Straits Area ARC, Dick Esterline KG8JK, editor, via the September 1999 ARNS Bulletin.

But Does He Have His Lunch?

According to news reports, Carol Dukes spent the equivalent of \$220 in United States currency on planes and taxis in a dash from her home in Berkshire to London's Heathrow Airport and on to Scotland — to catch her 11-year-old son Charlie after she realized he had left his GameBoy handheld computer game at home.

Charlie Dukes was on a school field trip. Carol Dukes caught up with her son's train at the Dumbarton station near Glasgow. She says that she is not an overindulgent mother, but did feel responsible for repacking Charlie's bag and forgetting to replace the game and his pencil case.

Ironically, Charlie Dukes and his 39 classmates were bound for the isolated island of Iona. The reason for the trip was to learn about life without any modern comforts or communications devices.

To which we must ask, Would a ham radio mom do the same thing if her child went off on a trip and left his or her HT behind?

Thanks to Jeremy Boot G4NJH, via Newsline, Bill Pasternak WA6ITF, editor.

Whose Job Is It?

This is a story about four people named Everybody, Somebody, Anybody, and Nobody.

There was an important job to be done, and Everybody was sure Somebody could have done it, but Nobody did it.

Somebody got angry about that because it was Everybody's job. Everybody thought Anybody could do it, but Nobody realized that Everybody wouldn't do it. So it ended up that Everybody blamed Somebody when Nobody did what Anybody could have done.

By the way, what's your name?

Thanks to The Modulator, the news and views of the Fort Myers (FL) ARC, Inc., Oct. 2001.

QCWA Scholarships

The Quarter Century Wireless Association has announced that it is funding several scholarships for 2002. There are eleven QCWA scholarships valued at \$1,000 each and five valued at \$1,500 each to be awarded later this year. Hams interested in applying for the QCWA Scholarships should contact the Foundation for Amateur Radio. The Foundation administers the scholarships sponsored by the QCWA. Additional information and an application form may be requested by letter or QSL card to the FAR Scholarships, Post Office Box 831, Riverdale MD 20738.

Thanks to QCWA, via Newsline, Bill Pasternak WA6ITF, editor.

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NEVER SAY DIE

continued from page 4

communications will be needed. What we don't need is to wait until we're faced with an emergency before we have our emergency systems ready to go and thoroughly tested.

When they start spreading anthrax, we're either going to want to know where to get a vaccine or else have our immune systems so strong that it isn't going to affect us. And it sure won't hurt to have a few gallons of silver colloid on hand. Once the terrorists strike, our doctors and nurses are going to be just as sick (or, more likely, dead) as everyone else, so you won't have to worry about sitting in a waiting room, waiting for a prescription for a vaccine.

Of course the best approach is to do as the terrorists hope and just wait to see what, if anything actually happens. And then panic. This war is going to be fought right here in America, and you've been drafted.

The Propaganda Barrage

There are thousands of radio and TV talk shows, all looking for interesting people to interview. Get interviewed.

Send news releases to every neighborhood paper announcing club meetings and activities. Make a big deal out of your speaker and his subject. This is your opportunity to let the public know about ham satellites, packet radio, DXpeditions, slow scan, your club's emergency preparations, repeaters, ham contests, and so on.

I want my mail to be stuffed with copies of ham newspaper clippings.

I want to see stories in the club newsletters about getting our 80% inactive hams activated. Call them up and invite them to a club meeting. Be sure to have a good speaker booked. We're going to need all 600,000 licensed hams pitching in.

Now, get busy with your word processor and give me some ammunition.

Senate Hearing

The other day they replayed a tape from the 1987 Iran-Contra hearings.

Continued on page 48

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LETTERS

From the Ham Shack

Somewhere in Afghanistan. Hi, Wayne: It will probably be April 1 by the time you get this, but I hope it will be worthwhile nonetheless. I cannot give you my name or address or anything, and indeed I have asked someone to carry the enclosed out of the country for me in case there was any problem with censors. But I don't feel there is anything unpatriotic in doing so, because I also don't think there is any military value in this, and plus I have told my superiors about it anyway.

So here is what happened: I was involved in the searches of the caves in Tora Bora. There was unbelievable stuff there, as you saw on CNN and we saw in person. Only obviously we saw much more than you.

But let me give you a little background first. I grew up in southern California, where I was into, in order, hot girls, hot cars, and — of all things — ham radio. This was because my dad is a ham, as well as a 73 subscriber. So I used to follow most of all the two Bills — one was the guy who wrote the Looking West column about all the repeater wars in our area, and the other was the old marine (K1CLL maybe?) who used to write

up these McGuyver-type projects where you could make a transceiver out of a toaster, or at least it seemed like it. So eventually I got my ticket and have been a fan (and reader) of 73 ever since.

Back to the caves: We went into this one huge cavern that looked like a giant office. The lights were even still on, and some of the computers were even still turned on, so we must have been really close. But there was about six inches of paperwork trash all over the floor. We were really, and I do mean really, afraid of booby traps there, but I guess they didn't have time for them.

I would say that I was probably the fifth or sixth person into the room, and once it was "cleared," we started looking for anything of use — names, photos, manuals, etc. — in the trash on the floor.

Suddenly, something caught my eye and set off a mental alert that I had seen it before — it was a photo torn out of an issue of 73!

As I looked at it, I remembered that it came from one of your reports about the mysterious Ishmod over the years /April

1984, April 1985, May 1999, April 2000 — ed.]. And the more I thought about it, the more I recalled that the stories included things about "camps" and "mysterious glows" and electrical engineering and even the civil unrest in Indonesia. Now, this!

Over in the corner of this room, up on pallets and still plugged in (some sort of generator system, obviously, but we couldn't hear anything), was one of these clunky old Xerox copiers that uses powder for a toner (and I'm here to tell ya that we get pretty itchy around black powder of ANY sort!). I was able to get to it before they started to remove the rollers to look for impressions, etc., and I made this one copy of the photo, which I send to you. As I said, I turned over the original, with explanation, in my report.

What do you think of this? Note the arrow newly drawn in. Does Ishmod really live?

P.S. Rx ex really great up here, if you know what I mean.

Submitted anonymously



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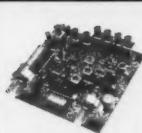
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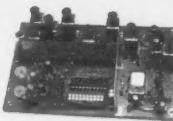


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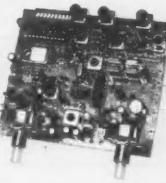
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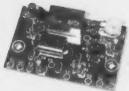
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If this nifty car frequency display doesn't draw gawks, nothing ever will.

Ever have the desire to let other hams who were sporting com antennas on their cars know a contact frequency? The following description of hardware for a rear window display will enable you to construct an easy-to-read suggested contact-frequency display system.

This system design and construction was developed by two of the Anne Arundel (Anne Arundel County, Maryland) Radio Club members upon request by another radio amateur. Some design criteria were: easy to read from a distance, low

cost, simple construction, easy to change display, and easy to install.

Design considerations

LCDs of the size desired (several inches tall) are very expensive compared with LEDs. Also, LCDs require

back-lighting during darkness. Instead of purchasing complete bar segment displays, separately mounted LEDs were used. The display selected was a 5 x 7 dot matrix of jumbo LEDs. Red LEDs were selected due to cost and brightness considerations. To minimize complexity and maximize display brightness, DC currents were used rather than strobing the display. To minimize the number of wires connecting the control panel at the dashboard to the display in the rear window, BCD switches and 7447 BCD-to-“N” of 7 drivers were used.



Photo A. Rear window display during daylight hours. Regulations regarding the placement of signs on vehicles vary from state to state. They may also vary with the type of vehicle (e.g., car, van, or truck), the location of the sign on the vehicle (e.g., rear deck, trunk, or side window) and the size or type of display (illuminated or passive). Contact your local motor vehicle office.

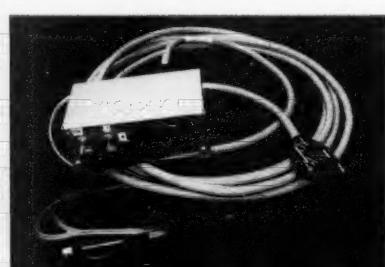


Photo B. A view of the control box with an 8-ft.-long 25-wire data cable. The cable is terminated with a DB-25 female connector. A 3-ft. power cable is also shown connected to the control box. This cable is terminated with a cigarette lighter plug.

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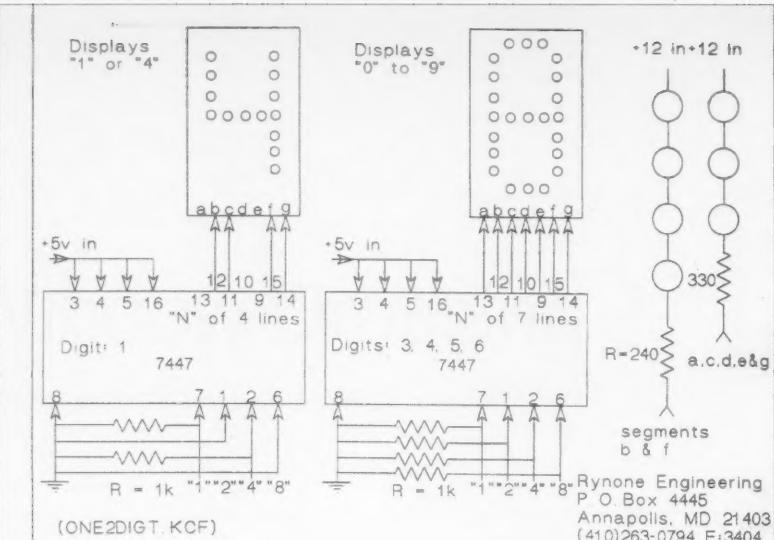


Fig. 3. Display schematic.

Ham Window Dressing

continued from page 11

Control box schematic

The display assembly consists of six decimal digits. Four of the digits are composed of seven-segment displays. The second digit is simply the decimal number "four." This digit is hard-wired as shown. The first digit of the system must display either decimal "1" or decimal "4" (for two meter or 440 MHz) — thus only four segments (b, c, f, and g) are required. Selection of either "1" or "4" is made via a single pole double throw toggle switch.

For the remaining four digits, BCD switches are used and the four output

terminals are connected to wires that interconnect the control box switches to the 7447 decoder/drivers. The output of each 7447 consists of a LOW logic level for "N" of 7 segments. The second digit is always displayed as a "4." Consequently, segments b, c, f, and g are hard-wired to +12 volts with the appropriate current limiting resistors (330 ohms for c & g, 240 ohms for b & f). It is worth noting that should it be desired to construct a display where all six digits are selectable, all that is required is to replace the SPDT switch-selected first digit and hard-wired second digit with two additional decoder/driver boards.

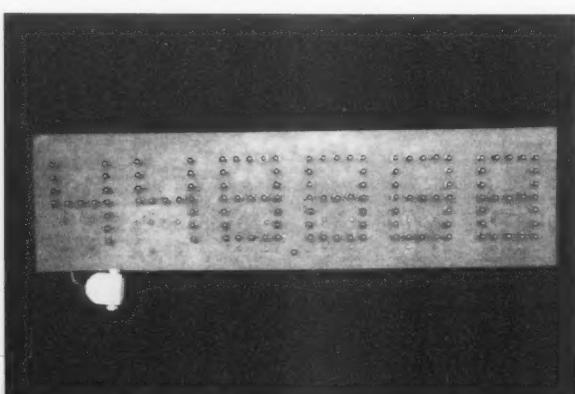


Photo C. Close-up front view of the display panel with a 6-in.-long, 25-wire data cable, and its terminating DB-25 male connector.

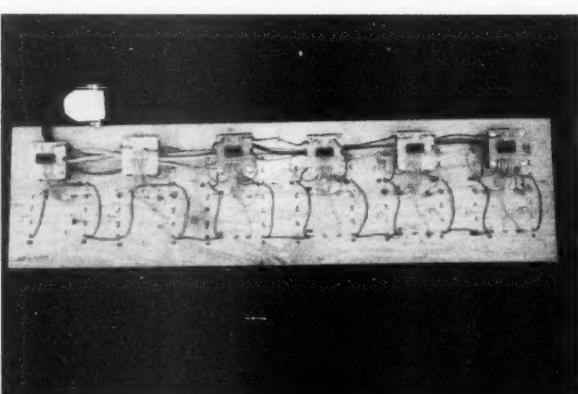


Photo D. Rear view of the display panel showing the wiring between the data cable and each of the display digits.

Installation

By employing a cigarette lighter plug, the display system may be easily removed from the car. This feature may be desirable where auto theft is of concern. The data cable may be buried underneath the front seat and then under the rear carpet and finally under the rear seat. For ease of removal, it may be desirable to not locate the cable under the rear seat and instead locate the cable on the side of the rear seat up to the rear deck. Also, plugs and jacks may be included at the cable entrance to the control box and also at the rear display. This would enable easy removal of the display

and control box and leave the cable assembly in place.

PCBs

Printed circuit boards are available for each digit of the 6-digit frequency display system at \$6 per board, plus \$1.50 S&H per 2 boards. You can purchase the set of all six boards for \$30 plus \$3 S&H. Inquiries should be addressed to FAR Circuits, 18 North 640 Field Court, Dundee IL 60118. Phone 847-836-9148, or E-mail [farcir@ais.net].

Acknowledgments

Mr. Oscar Ramsey did quality con-

struction and testing. Dick Wilkinson used his Nikon to take professional-quality photos. Professors (ret.) Ralph Santoro and Steve Burns kindly provided technical assistance.

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Table 1. Parts list.

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SOS ... SOS ... *Titanic!*

Radio operators' courage still inspires amateurs.

In 1910, the government required all ships to have a wireless telegraph. Yet by 1912, fewer than 400 ships were equipped with Marconi wireless. It was the Titanic disaster, just off the coast of St. John's, Newfoundland, which finally proved the value of wireless to the world. This article is about the Titanic's fateful day and the two wireless operators, John Phillips and Harold Bride, who performed their duties with valor and honor. We reprint it to honor the 90th anniversary of the disaster.

Working on the *Titanic* was serious business and hard work for senior telegraphist John George Phillips, 24, and junior telegraphist Harold Sidney Bride, 22. Although signed on with the crew as telegraphists, the two men were actually employees of Marconi International Marine Communications Company, Ltd. Ship-to-shore wireless transmission was in its infancy and viewed more as a convenience than an integral part of the ship's command. The operators were under the captain's command, but only with regard to receiving and transmitting messages of importance to the ship. Their main job was taking care of the passengers' telegrams while at sea. The ship's weather reports and ship-to-ship telegrams came second, as they weren't paying customers. Under its agreement with the Marconi Company, the White Star Line, owner of the *Titanic*, was provided with free wireless messages between the ship and its owners or other ships regarding navigation, safety, or the ship's business, provided the messages did not exceed

a 30-words-per-day average. Excess words were charged to the ship's owner at half the usual tariff rates. In return, White Star was to provide the Marconi operators with their meals and lodging. The Marconi Company, in turn, paid John Phillips and Harold Bride approximately \$23 per month and \$12 per month, respectively.

The fateful Sunday

On Sunday, 14 April, 1912, Phillips and Bride had been busy receiving, logging, and transmitting passenger messages. Wireless transmitting and receiving ranges increased markedly at night, and night signals from the powerful British land station at Poldhu (call letters MPD) relayed by intermediate ships had included news, stock reports, and some personal messages. There had been daily traffic messages to and from *Titanic*'s passengers. The ship's 1.5-kilowatt wireless transmitter, among the most powerful afloat, had a 400-mile daytime transmitting range. This range increased significantly at night, but during the day, particularly now in the North Atlantic, its functions were limited to ship-to-ship messages.

Signals were transmitted and received on closely adjacent standard frequencies, with two, three, or even more signals being sent or received at the same time. Much of the operator's skill involved being able to discriminate and select the particular messages addressed to his station. To assist operators, each station had its particular identifying call letters. With few exceptions, call letters from British ships generally began with M, while those of German ships started with D, and United States naval vessels with N. *Titanic*'s call letters were MGY.

The long hours and tedious work made the job very stressful for Phillips and Bride, but fortunately for them they would work in shifts to help each other at the Morse key. In 1912, laws did not require two operators or 24-hour watches on the ship's wireless. Many passenger liners and all freighters had single wireless operators who rested or slept when they could.

Ice!

Wireless operators were supposed to intercept for their captain's attention all messages relating to the navigation and safety of his vessel. Phillips and

Reprinted from the October 1997 73
Amateur Radio Today.

Bride received several messages concerning ice conditions in an area toward which the *Titanic* was directly heading. At 9:00 a.m., a message from the *Caronia* was taken immediately to the bridge, where it was posted for the officers' attention. Another message was received from *Athinai* via the *Baltic*:

*Captain Smith, Titanic
Greek steamer *Athinai* reports passing icebergs and large flotation of ice field today.*

This message placed icebergs within a few miles of *Titanic*'s track. It was taken to Captain Smith. The message was not posted on the bridge nor entered in the scrap log until 7:15 p.m.

As daylight turned to dark, the cool air began to turn cold. At 7:00 p.m., it was 43 degrees. Because of the day's wireless messages, an iceberg watch was ordered. By 7:30 p.m., atmospheric temperature had dropped to 39 degrees.

At this time a message from the *Californian* to the eastbound freighter *Antillian* was overheard by the *Titanic*'s wireless operators. Harold Bride delivered the message to the bridge and handed it to an officer. The *Californian* message reported ice about 18 miles north of *Titanic*'s track. By 8:40 p.m., the air had fallen to 35 degrees as the *Titanic* steamed full ahead at 21 knots. Around 8:50 p.m., Captain Smith was briefed by his officers about weather conditions and the ice and about the precautions that had already been taken.

More warning

It was 9:40 p.m., and in the wireless shack Harold Bride had turned in for a nap before working the busy late-night traffic. John Phillips was manning the transmitter alone when a message was received from the westbound *Mesaba*:

*To *Titanic* and eastbound ships:
Ice reports. Saw much heavy pack
ice and great number large icebergs.*

Also field ice. Weather good, clear.

The land station at Cape Race, Newfoundland (call letters MCE), was in range now and John Phillips was very busy transmitting messages which had accumulated during the day. Unable or unwilling to leave his key unattended, he ignored the *Mesaba*'s ice message which described ice directly ahead for *Titanic*.

The message never did get to the bridge. With lights from the ship's decks seemingly guiding the way, *Titanic* sped with determination through the night at 21 knots. The sea was so calm that one officer on the bridge made the comment that in all his years on the sea he had never seen it so flat. The stars shone brightly in the moonless sky.

As 10:30 p.m. approached, the steamer *Rappahannock*, passing on an opposite course, signaled the *Titanic* with its Morse lamp:

Continued on page 16

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SOS ... SOS ... *Titanic*!

continued from page 15

Have just passed through heavy field ice and several icebergs.

Titanic replied by signal light:

Message received. Thanks. Good night.

Titanic continued on her course, speed undiminished. In the wireless room, John Phillips was very busy with Cape Race traffic as well as sending and receiving messages to and from other ships. A few minutes before 11:00 p.m. he was interrupted by a very strong signal from a nearby ship, the freighter *Californian*, twenty or so miles away to the north:

I say old man we're stopped and surrounded by ice.

She was so close that she almost blasted Phillips' ears off. Annoyed by the intrusion interrupting his traffic, John Phillips curtly responded:

Shut up. Shut up. I am busy. I am working Cape Race.

Californian's wireless operator, Cyril Evans, rebuffed by John Phillips' curt message, listened for several more minutes to Cape Race traffic. Then, around 11:30 p.m., he turned off his equipment and turned in.

Doomed

On the *Titanic*, two crewmen in the crow's-nest swung their arms in an effort to keep warm in the freezing air. Their eyes strained into the night's darkness ahead. They had wished they had their binoculars to help them see better. Somehow, the binoculars had been misplaced the day before.

Suddenly, without a word, one of the crewmen hunched forward and peered intently into the black, moonless night. He immediately reached for the bell lanyard and gave three sharp pulls to signal an alarm. He then picked up the phone piece and called the bridge: "Iceberg right ahead."

The warning was too late. The officers in the bridge stopped and reversed engines and averted a head-on collision with a large iceberg, but the huge iceberg managed to strike a glancing blow on the *Titanic* fifteen feet above her keel. The gash extended for 300 feet along her side, flooding five of her compartments. The *Titanic* was designed to float with three or four flooded compartments, but not five. She was doomed.

Carpathia to the rescue

By 12:05 a.m., the *Titanic*'s front compartments were rapidly filling with water and all engines were stopped. Captain Smith, realizing the ship was sinking, personally went to the wireless room and instructed the wireless operator to order a call for assistance. "You had better get assistance," Captain Smith told his wireless operators.

John Phillips set the frequency on the multiple tuner to 600 meters, adjusted the spark gap for maximum range, and sent out the standard CQD distress call (some operators called it Come Quick, Danger) from *Titanic*'s huge antenna. Later that night, Harold Bride decided to use the new distress signal, SOS, which was just coming into use. *Titanic*'s wireless operators sent one of the first SOS's from a ship in distress.

SOSSOSCQDCQD—MGY.

This was a call for help to save over 2,200 lives on a ship that only had enough lifeboats to save 1,178.

By 12:45 a.m., several ships and land stations had responded to Harold Bride's and John Phillips' distress calls. The *Carpathia* was 58 miles from the *Titanic* at the time of collision and responded immediately. *Carpathia*'s captain turned his ship around and raced to the rescue.

Opportunity lost

Although the *Carpathia* was close to the distressed *Titanic*, there was another ship that was much closer — but it never heard the *Titanic*'s wireless distress calls. The wireless operator on the *Californian* had turned off his

wireless and gone to bed after John Phillips had told him not to interfere with his commercial traffic. The *Californian* could have saved the lives of all the *Titanic*'s passengers if only the operator had not shut off his wireless and turned in for much-needed sleep.

Abandon ship!

On the *Titanic*, Captain Smith ordered loading of the lifeboats with women and children first. By 1:30 a.m., *Titanic*'s bow was distinctly down and she listed heavily to port. The slant of the ship's deck was becoming steeper and people were having trouble keeping their balance as they moved toward the stern. Lifeboats were being lowered into the calm sea 60 feet below the ship's deck. Although the lifeboats were capable of carrying 65 passengers, some boats were filled with fewer than 20 people.

Signs of panic began to appear. In the wireless shack, John Phillips and Harold Bride were still at their posts, their distress calls becoming increasingly desperate:

Engine room getting flooded.

At 1:45, another distress call:

Engine room full up to boilers.

Every man for himself

By 2:05 a.m. most of the lifeboats had been lowered (except for the collapsibles) and had moved away from the *Titanic*. More than 1,500 people still remained aboard. With the boats all gone, hundreds of passengers left behind stood quietly on the upper decks. A quiet calmness set in. Captain Smith made his way to the wireless room and told John Phillips and Harold Bride that they had done their duty. Now it was every man for himself.

Into the sea

As the ocean water filled one compartment after another, the water's weight pulled the *Titanic*'s bow completely under. The great ship's immense bulk started a catastrophic arc into the star-filled sky. As the *Titanic*

upended, hundreds and hundreds of people were thrown into the sea. The water temperature of the North Atlantic was about 28 degrees Fahrenheit. As energy from the generators faltered, the last wireless signal spluttered to a halt.

At 2:20 a.m., the liner started its nearly vertical descent downward into the sea. Not yet completely under the surface, with a loud roar the sinking hull broke in two near an expansion joint and engine room shaft. The forward section of the ship began its drop to the ocean floor over two miles below, while the stern section remained afloat a few seconds more before it, too, plummeted to the bottom.

Down with the ship

Almost immediately, the silent night was filled with the calls of floating survivors, growing in number until there was almost a continuous wailing chant. Hundreds of people cried for help as they struggled in the icy cold water. Some of the ship's 1,500 passengers managed to reach some of the lifeboats, but most did not. Long before dawn, hypothermia had claimed the lives of most of the floating survivors. The rescue ship, *Carpathia*, arrived around 4:00 a.m. and started to take on survivors from the lifeboats that held mostly women and children. Everyone was still in shock, not only from the horrendous experience they had just witnessed but also from the bitter cold that engulfed them. In all, 711 passengers survived the ordeal. Captain Smith did not survive. He went down with his ship.

Constant duty

Of the two wireless operators on the *Titanic*, only Harold Bride survived the tragedy. Even after his subsequent rescue by the *Carpathia*, he continued to perform his duties as a wireless operator. The ship already had a wireless operator named Harold Cottam, but he had not slept for many hours and was totally exhausted. Bride had to be carried from the dispensary, where he was treated for severely frostbitten feet, to the wireless room where the exhausted

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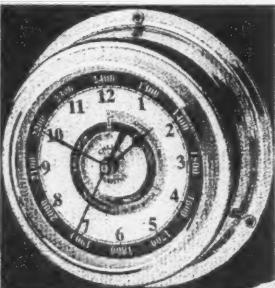
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Cottam was working. Once Bride began to transmit, Cottam got a few hours of precious sleep. Both Cottam and Bride ignored all information requests from private and public sources even as the *Carpathia* sailed full-steam to America.

Once the *Carpathia* reached New York, Bride was carried ashore on the shoulders of two *Carpathia* officers. Among the last of the survivors to be brought ashore, Bride had been almost constantly on duty since boarding the ship from an overturned collapsible boat and now, totally exhausted, he was taken to a nearby hospital for treatment of crushed and frostbitten feet.

Inquiry

At the *Titanic* inquiry, several proposals were made:

1. Lifeboats required to have increased capacity, a seat for each person aboard, and adequate manning.
2. Wireless stations required to have 24-hour manning.
3. Amateur interference banned.
4. All ships required to provide reliable auxiliary power sources.
5. Wireless operators required to maintain secrecy of all messages.

These wireless recommendations resulted in the Radio Act of 1912, which required all ships to carry wireless stations. The Act also contributed to the Marconi Company's extraordinary financial success.

"The last I ever saw of him ..."

The wireless operators of the *Titanic*, John G. Phillips and Harold Bride, went into the history books as two young men who heroically stood at their post, bravely transmitting distress signals until moments before the huge ship sank. John Phillips' body was never recovered. Harold Bride said of his coworker, "Phillips ran aft and that was the last I ever saw of him."

Harold Bride kept a very low profile in the years following the *Titanic* disaster. World War I found him as a wireless operator aboard the steamer *Mona's Isle*. Later in life, he became a salesman before returning to Scotland, where he died in 1956.

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Say you saw it in 73!

Hugh Wells W6WTU
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Does Your Junk Box Runneth Over?

A true junkie explains how to get a grip.

As has been said for many years, "One man's junk is another man's treasure!" And so it goes with the unique collection of ham and electronic items that not only have status just as "stuff," but also have a personality depicting their owner.

Junk being another person's treasure is the philosophy behind all swap meets. We, as hams, go to swap meets to obtain those items that we need — or at least think that we need. The driving force, of course, is that we have money burning a hole in our pocket and we hope to find something for a "bargain" price. Ask yourself

how often you've gone to a swap meet looking for a particular something. Even if you didn't find what you wanted, you most likely carried something home that you just needed to have — that's called impulse buying. Don't feel like the Lone Ranger, though, because all hams suffer from that syndrome. We're collectors of all things deemed valuable and useful.

What makes up a ham junk box? Now that's a question only you can answer, because of the uniqueness of the composition of the "junk" in your possession. My definition of "junk box" is a warehouse of parts stored for personal projects — though who knows

Continued on page 20

Light Bulbs				
PR-2	2.38V	500mA	15 hrs	blue bead, 2-cell flange base 7
PR-8	1.9V	600mA	10 hrs	2-cell flange
6PS-B	6.0V	140mA	800 ft-candle	—
40	6.3V	150mA	3000 hrs	E10 threaded base 8, RS 272-1128
46	6.3V	250mA	3000 hrs	blue bead, screw base
47	6.3V	150mA	3000 hrs	brown bead, bayonet base 9, RS 272-1110
48	2.0V	60mA	1000 hrs	pink bead, E10 screw base
49	2.0V	60mA	1000 hrs	pink bead, bayonet
53	14.4V	120mA	1000 hrs	1CP, blue/white bead, base 9, RS 272-1117

Table 1. Example of a data listing for light bulbs stored in a ham's junk box.

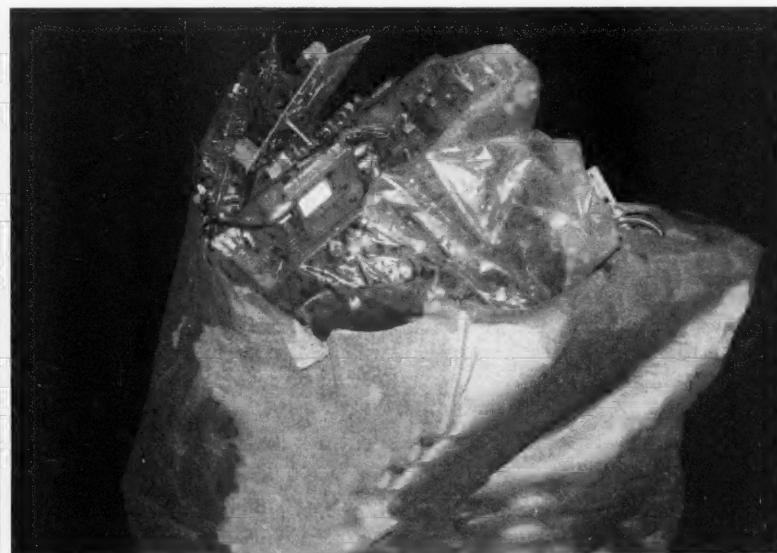


Photo A. Example of parts and assemblies being stored in paper and plastic bags. Bags are filled until they overflow.



Photo B. Example of parts and equipment stored on shelves. A stacking technique is used to fill up available space — then jam in the next item.

Does Your Junk Box Runneth Over? *continued from page 19*

when a project will materialize from the stored items.

When a stranger looks into your "junk box," they usually ask, "What is it that you're going to do with all of this stuff (junk)?" What they're failing to grasp is the "value" one places on the "stuff" that's stored for future usage. Value, as used here, refers not to



Photo C. Labeled cigar boxes containing "junk box" parts are stacked on shelves. Having boxes two stacks deep is common practice.

financial value, but to one's understanding of the item and its usefulness in an application. Items of value can be of any size, shape, or configuration, whether in the form of components or completed devices. Electronic components are of value only to the extent that one understands their characteristics and usefulness in a project or application.

Using myself as an example, I've been collecting electronic parts since I was very young (they're still in my junk box). I understand the parts and

know how to use them in a project, should I choose to build one. From that aspect, I feel that I know the technical "value" of the part and how to apply it to an application. Does this mean that I have a use for it today? Probably not. I have some tubes that date back to the mid-1920s era that are still good and could be used in a project — but whether I will ever build something with them is the question. The answer is probably not, and knowing the technical value of those antique parts prevents me



Photo D. Example of a cabinet containing plastic drawers. Drawers are labeled to indicate the part within along with cursory technical data.

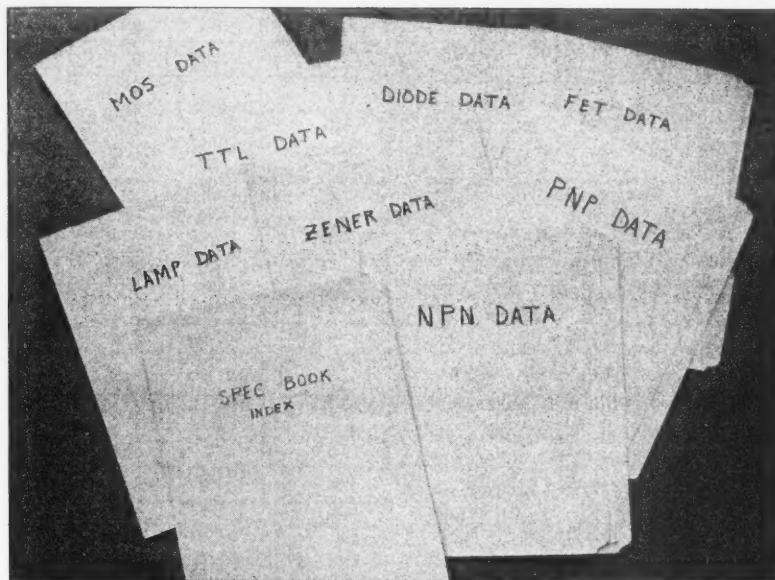


Photo E. Example of how file folders may be used for capturing part data listings. The individual listing may indicate the number of parts available in the junk box.

from disposing of them during my lifetime. True, and following my demise, my kids will probably view the "stuff" as junk and will pitch it into the trash.

If you're like me, you've built up a "junk box" of parts that are of value to you. For that reason, parts have accumulated regardless of whether there is a dedicated project in the near future for them.

Organization

The above discussion brings up the

question of how the parts in your junk box are organized. The usefulness of your junk box is really measured by your ability to quickly find the needed item. How have you stored your spare electronic parts so that they can be retrieved when needed? Does your storage technique create the appearance as shown in **Photo A**? If so, how do you remember or know what's in the bag? With this type of organization, you have to dump out every item while searching for that one needed piece. Yes, that search and rescue operation

Continued on page 55



Photo F. Example of bound volumes of part specifications placed on a shelf for ready reference. File folders to the left contain the part data listings.

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New Life for a Pierson KE-93

Part 3 of 3.

Parts one and two of this series restored the companion power supplies and part of the KE-93 receiver to an operational state. But although the receiver appeared to be ready to operate, it still failed to show signs of life.

This final part in the series will discuss the problems that prevented normal operation and the repairs required to fix them. Following repair, the receiver was evaluated for both function and performance, with the results reported herein.

Receiver (continued)

Correcting the dial cord problem, as discussed in part 2, was a major hurdle in preparing the receiver for normal operation. But with power applied to the receiver, it was still "dead," and the reason wasn't immediately apparent.

To begin the troubleshooting process, I removed the RF shield above the front-end tube sockets and tuner, and this allowed me to make voltage measurements on the four front-end

tubes. The voltage values measured on the plate and screen grids of tubes V3 and V4 just didn't seem to be correct, but I was momentarily unable to determine the problem. Tubed equipment gets warm after being "on" for a while, and when I touched tubes V3 and V4 to check for heat, I found them to be cold. After substituting one tube and finding that it also remained cold, I immediately concluded that it wasn't a tube problem. Yes, the heater voltage measurements at the tube sockets of tubes V3 and V4 indicated a problem, and the measured values were not as expected.

I traced the wiring for both tubes and found the ground lead tie point for tube V4 to actually be inside of the power supply — but the ground circuit

was open and the lead failed to connect to ground. The problem turned out to be a dirty contact in the connector of the power supply cable where it attached to the back of the receiver. Cleaning the connector contacts — again — resolved the problem for tube V4.

Tube V3 still didn't have heater power, and upon tracing the wiring I found a 15-ohm 2W resistor attached to a socket on the underside of the receiver chassis. Someone had cut the resistor lead with diagonals and left it hanging. Soldering the resistor lead to the socket pin resolved tube V3's problem, and the receiver began to operate.

Upon getting the receiver to operate, I worked up the voltage chart shown in **Table 1** for the front-end tubes. With tubes V3 and V4 heating properly, the measured socket voltages appeared to be more logical for the circuit design.

As I began adjusting the controls to tune in stations, the noisy/dirty pots and dirty turret contacts began to "speak loudly" and cried out for help. I sprayed all of the pot resistance cards with a TV tuner cleaner and they cleaned up quickly.

TV tuner cleaner didn't seem to be appropriate for the silver-plated turret

Tube	Tube Pins (B+ = 223 V; band = 80m; max. sens.)								
	1	2	3	4	5	6	7	8	9
V1	0.07	1.24	—	—	193	75	0	—	—
V2	-25	1.88	—	—	193	40	0	—	—
V#	-15.5	0	—	—	115	101	—	—	—
V4	-49	2	—	—	214	35	—	—	—

Table 1. Chart showing the voltage values measured at the socket pins of the front-end tubes. The shield must be removed to obtain access to the socket pins.

Band	Freq. (MHz)	Sens. (μ V)
BC	1.0	6
	1.6	1.8
160	1.7	0.25
	3.4	0.6
80	3.5	0.2
	4.0	0.15
40	7.0	0.2
	7.3	0.1
20	14.0	0.25
	14.3	0.2
15	21	0.6
	21.4	0.6
10	28	1.5
	30	0.8

Table 2. Signal sensitivity chart as a function of frequency that I measured for one KE-93 receiver.

contacts, so I wiped them with a dry paper towel and they polished up well, eliminating the contact noise.

At this point, it was obvious to me that the mechanical parts required lubrication. Applying motor oil to each moving point resolved the high friction problems. The oil was transferred to the selected points by dipping the tip end of a thin-shaft screwdriver into the oil and carrying a drop or less of oil to the point where it was needed. All excess oil was wiped up with a

paper towel. The important thing was to apply oil only to the points where mechanical friction was occurring and to keep the oil away from all of the electronic circuits.

Operation

Once the receiver was operating without mechanical and electrical problems, it was time to do a performance check to see just how well the receiver was operating and how it compared to a modern solid-state receiver.

One of the first performance tests that I normally do is to measure a receiver's sensitivity to a weak signal. As I've said before, most receiver designs of the 1950 era exhibit a sensitivity of about 2 μ V as compared to the modern solid-state receivers that operate down to about 0.2 μ V. When measuring a receiver's input sensitivity correctly, signal-to-noise ratios are the most discriminating and meaningful. But not everyone can make such a measurement, so a comparable substitute technique is used. Yes, the comparable test is subjective, but it does provide a means for equating a receiver's performance with a numbered value. The method that I used is a minimum detectable signal level where the modulated signal remains discernible. In this case, signal-to-noise ratio sensitivity accuracy is traded for the ability to perform a "comparable

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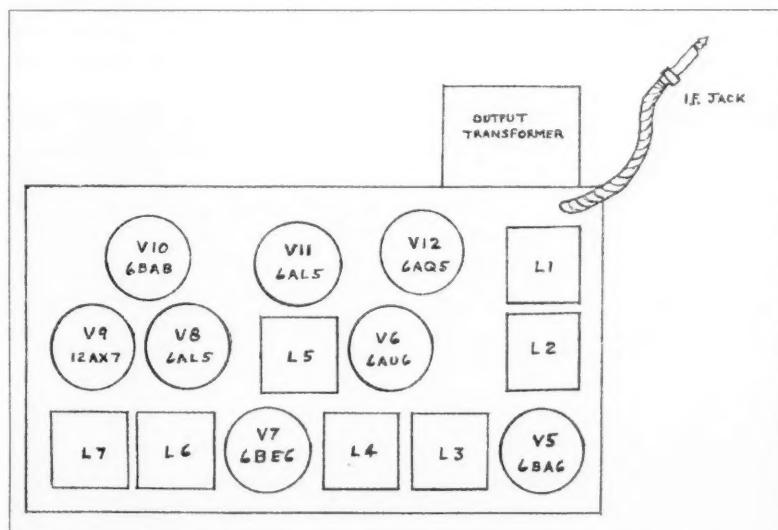


Fig. 1. General layout of the tubes used in the KE-93 receiver's IF module.

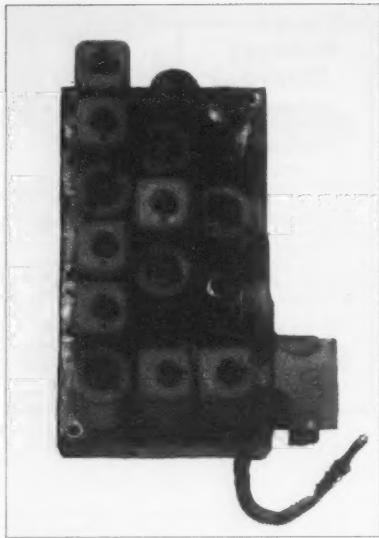


Photo A. Top side of the IF module showing the compact design. The audio output transformer is shown on the rear of the chassis.

measurement" using available equipment such as a calibrated output signal generator.

Table 2 shows the band, frequency of measurement, and sensitivity value that I obtained for the KE-93. The numbers impressed me because no other tubed receiver had performed as well on my test bench. The only thing that I can attribute to the nice performance is

the HI-Q turret tuner design. Of course, the low-noise 6BZ6 RF tube helps, too!

Before leaving the sensitivity performance, let's note that most competitive receivers exhibit a better sensitivity with the BFO turned "on" when compared to the AM mode. As I determined for the KE-93, the CW and AM sensitivity remained the same, and I was curious to determine why. What I discovered was that the KE-93 design reduces the BFO injection level when in the SSB mode when it is needed for proper SSB audio recovery.

The KE-93 was one of the first ham band receivers to be designed with SSB as an operating mode. Even though the receiver does not have a product detector, it's hard to tell that from the superb SSB performance that's exhibited.

When operating the receiver in the SSB mode, the AF gain is advanced to near maximum and the SENS level is reduced slightly. Yes, because of the sensitivity factor, the front end can overload when either the CW or SSB mode is selected and the RF gain is set too high. Backing down the SENS level (RF gain) slightly, the receiver became alive and performed well during my tests.

After tuning around the bands and listening to SSB signals, I noticed that the receiver was doing a pretty good job of separating adjacent signals. This raised my curiosity as to the IF's bandwidth. I ran a number of cursory tests and came up with a bandwidth of about 2 kHz. I couldn't determine the shape factor, so I can't comment in that regard.

IF module

While preparing the receiver for the application of power, I removed the IF module from the rear deck of the receiver and examined it. Because of the compact design, it was very difficult to work up a signal path, but I eventually got enough information to develop the signal path block diagram. **Fig. 1** and **Photo A** show the top side of the module layout identifying the tubes and IF transformers.

To remove the IF module from the

receiver, I used the following procedure:

1. Pulled back the two connectors located on the underside of the receiver's chassis.
2. Pulled the IF wire/plug from the RF deck.
3. Removed the two screws located on opposite corners of the module.
4. Carefully lifted the module until the connector panel cleared the receiver's chassis.
5. Tilted the module up slightly to achieve connector panel clearance, then moved the module rearward.

A visual inspection of the underside (see **Photo B**) allowed me to detect two capacitor problems and one resistor problem. The 12 μ F filter capacitor connected to the cathode of tube V9 had a cracked ceramic case. The other capacitor was a dried-out electrolytic capacitor connected to the cathode of tube V12. Finding the mechanically bad 1/2 watt resistor was interesting. The resistance value had shifted from 4.7k to nearly 9k ohms, and I was really surprised to find a resistance shift in a molded carbon resistor. However, what caught my eye was a very small chip knocked off of the corner of the resistor body near one lead.

When removed from the receiver, performance testing and voltage measurements on the IF module for troubleshooting purposes are difficult without an external test fixture. Due to the compact design and shielding, the bottom of the module is covered with metal, preventing circuit access while the IF is mounted.

The resistance chart shown in **Fig. 2**, could be helpful should a problem exist within the IF module. With the module removed from the receiver, several of the circuits will appear to be open, but they would normally be completed with the module mounted to the receiver.

Cleaning operation/notes

Cleaning of the Pierson KE-93 was limited to washing the faceplate casting and the cabinet. For the faceplate casting, I scrubbed it with a toothbrush

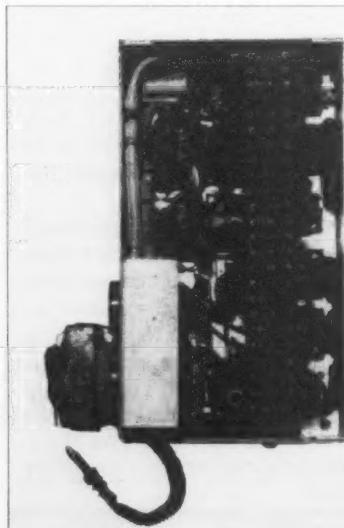


Photo B. Underside of the IF module showing the compact design. The audio output transformer is shown on the rear of the chassis.

Phil Whitchurch G3SWH
21 Dickensons Grove
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United Kingdom

The Call of the Maldives

8Q7WH, that is ...

After our eventful visit to Sri Lanka in November 2000, there was not much doubt about where our next trip would be, mainly due to the fact that our flight home was routed via Male and Abu Dhabi.

After an hour's flight, we spent a further hour on the ground in Male airport and were able to get off the plane and wander around the duty-free shops, etc. Jan fell in love with the posters on the walls depicting white sand and simple water bungalows linked with a system of jetties. Although we have tended to steer clear of beach holidays and pursued more "activity" types of vacations, it certainly looked tempting. Jan said, "I think I could stand a week here." I said, "It's ever so easy to get a license."

Taking off from Male, we were treated to breathtaking aerial views of the archipelago, with innumerable tiny islands poking above the coral reefs.

Once back in the grips of the UK winter, time was spent scanning over the travel sections of the weekend papers. Last year's sojourn to Mykonos had been beset with poor weather and was not as successful as in previous years, so we decided to look elsewhere. It wasn't long before Jan spotted a Travel Collection advertisement offering an all-inclusive week in June

on one of the Maldivian islands at a price which suited our budget. A copy of the *Lonely Planet* was swiftly purchased, the deposit paid, and a seaplane transfer arranged.

OH2MCN's Web site once again came up with good information about the licensing procedure. This merely involved downloading a copy of the application form, completing and sending it to the licensing authorities by fax on 15th January, together with a copy of my UK license and a covering letter asking for the callsign 8Q7WH. I received a fax almost by return confirming the callsign had been reserved and asking me to arrange for the fee of 125 Maldivian rufiya (MRF) — about US \$10 — to be paid by my tour operator's agent in Male. This proved to be one of the most difficult parts of the whole procedure and involved contacting Travel Collection by E-mail (no response) and fax (not received), and sitting in a telephone queuing system for up to 15 minutes at a time. Eventually, I received a copy of the three months' license by fax on 3rd April, together with a note that this document would enable me temporarily to import my radio equipment.



Photo A. An aerial view of the airport on its own separate island.



Photo B. A Twin Otter seaplane.

The Maldives are an independent country within the British Commonwealth and consist of over 1,000 low-lying coral islands grouped in 26 atolls about 600 km southwest of Sri Lanka. No natural land stands greater than 2.4 meters above sea level!

The ocean around the Maldives is world-renowned for the snorkeling and scuba diving. My good friend Bruce Sawyer ZF2NT spends six months of the year diving on Little Cayman and told me he believed the diving in the Maldives to be superior to the Caymans. Neither Jan nor I are very strong swimmers, so we decided to learn to snorkel properly and attended a number of informal lessons

during the weeks preceding our departure. I even tried on an aqualung at one stage and would not have needed much encouragement to turn the snorkeling into diving, but Jan was not so keen. Considering the length of rope which I get playing radio on holiday, I decided that a second activity excluding Jan was not a good idea, and so drew the line at snorkeling.

Check-in at Gatwick was uneventful and the ski bag containing the R-7000 vertical raised no eyebrows. Jan and I split the radio equipment between our respective hand luggage, and there was a difficult moment at the departure gate when the clerk declared mine to be too heavy and asked that it be placed in the hold. Fortunately, I was

able to convince him of its fragility and kept it under my control throughout the flight. There was a short stop at Bahrain to refuel and change crews, and we arrived at Male on time on 4th June. The baggage, including the R-7000, also arrived, and after subjecting it to an X-ray examination by customs we made our way to the seaplane terminal for the 30 minute flight to Velidhu Island in North Ari Atoll, about 85 km to the west of Male. The aircraft was a Twin Otter, and I was amazed to find it to be fitted with an Icom IC-706 tuned to 3407 kHz.

Islam is the religion of the Maldives and no alcohol or pork is permitted on any of the 202 "inhabited" islands. Velidhu is one of 90 or so island resorts, which are officially "uninhabited" — i.e., no Maldivians live there on a permanent basis. Consequently, there are no restrictions on the consumption of alcohol, etc. The island covers some 19 acres and has 80 individual, circular bungalows with thatched roofs, known as rondavels, scattered amidst the palm trees and lush vegetation. There are also 10 overwater bungalows on the northwest side of the island, which were available at an extra cost of US \$50 per day.

Arriving at the island, we were personally welcomed by the hotel manager and very quickly checked into our most comfortable, double-bedded, en-suite rondavel. Contrary to the Travel Collection's handouts, there was one



Photo C. Velidhu Island from the air.

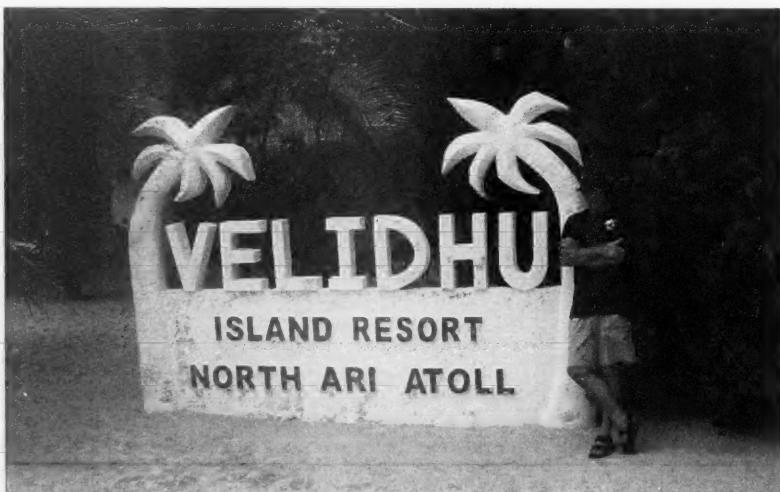


Photo D. Proof that I was there!



Photo E. Our rondavel.

of their representatives on hand who theoretically also looked after the guests in six other resorts. In view of the difficulties in traveling between her resorts, she rarely seemed to leave Velidhu! She greeted us with "Mr. Whitchurch, have you got your radio license?" When I said not, she explained that she had sent it to Male to be handed to me on arrival, just in case of any problems with the customs, but that she would retrieve it and give it to me during the next day or so.

By now the daylight was failing and I wanted to get the antenna erected before dark if at all possible. Our rondavel was on the east side of the

island with a screen of bushes between it and the beach. I would have liked to put the R-7000 on the beach itself but was worried that I could not anchor it properly in the soft sand and that, as it would be out of sight, someone might injure himself or herself by tripping over a guy rope. Consequently, I set it up in a clearing between two of the rondavels and guyed it to the trunks of trees to minimize the tripping hazard. There was nowhere to rig a wire antenna as an alternative, because the numerous palm trees were all too short and close together.

It was now fully dark and, after a much-needed shower, we made our



Photo F. The R-7000 antenna set up in a clearing between two rondavels.

way to the bar and a pre-dinner drink. Under the "all-inclusive" deal, in addition to all meals we were entitled to unlimited quantities of free beer, cocktails, spirits and soft drinks in the bar and to glasses of red or white wine in the restaurant. Jan and I are both wine drinkers and found it strange that wine was not available in the bar, except at extra cost. Over an aperitif we struck up a conversation with a couple that had been on the seaplane with us, during the course of which we discovered that they lived in a small village near Bristol. Further enquiries established that they actually lived about 200 yards away from us and had several acquaintances in common, although we had never previously met. Indeed, it is a small world!

Dinner was a first-class buffet eaten with our new friends, and we were well looked after by our waiter Mohammed, who kept us well supplied with glasses of excellent Californian wine. Mohammed was a Maldivian national, although most of the staff were Sri Lankan or Bangladeshi. After dinner, we retired to the bar where I ordered brandy, which was served in a full wine glass. At this point, I came to the conclusion that an "all-inclusive" deal was potentially dangerous!

Next morning I was up early, feeling surprisingly bright. I set up the station on the patio outside the room, straightened the antenna and put out a few

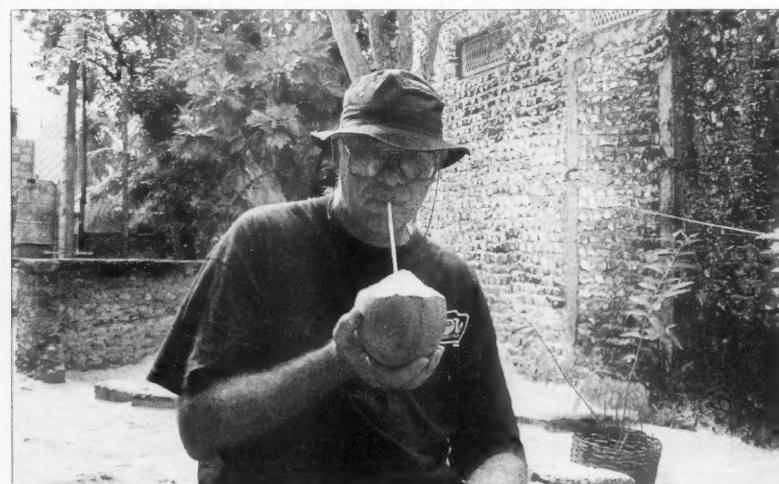


Photo G. Phil Whitchurch G3SWH.

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calls on 21 MHz CW. The first QSO was with 9M2SZ at 0347 UTC on 5th June, but the band was very quiet so I went back to bed and we both slept late, missing breakfast. The patio furniture was designed for relaxation and therefore not very practical for radio operations, so I arranged for a "normal" height table and chair, which was altogether more comfortable.

In March 1998 an El Niño (temporary increase in seawater temperature) event bleached much of the coral throughout the archipelago, killing most of the algae living within the coral polyps, particularly in the shallow waters. Consequently, the coral itself is mostly an unsightly brown color, but with some more colorful new growth showing through in places. Despite this, the house reef provided excellent snorkeling for beginners like us, with myriads of multicolored fish of all sizes to be seen, including parrotfish, blue surgeonfish, rock cod and eagle rays. A particular favorite was a triggerfish that frequented the water around the jetty and could be fed with pieces of bread stolen from the breakfast buffet.

Radiowise, I found that my usual pattern of a session in the mornings and a session in the late afternoons didn't work. Admittedly, the first couple of morning suffered from the "all-inclusive" syndrome, but even then the activity just wasn't there. The late afternoon session was much more productive, with a couple of very satisfying pile-ups of Far East stations on 18 and 21 MHz. QSOs with Europe and the USA were very few and far between. This was probably due to the fact that we were on the east side of the island and the path to Europe was straight through the island's vegetation. 28 MHz was unusable due to intruders using CB-type radios for inter-island communications.

We wanted to see something of the true culture of the country, but escaping from the island was slightly difficult. We finally managed to negotiate a 20-minute ride on a speedboat to the neighboring "inhabited" island of Mathiveri. Mohammed asked if he could join us, as he had a friend there

who he would like to visit. As it was his off-duty time, we readily agreed, fully expecting him to disappear on arrival and reappear at the agreed departure time. We were pleasantly surprised, as we were introduced to his friend and family, given fresh coconut milk to drink through a straw in the shell and fresh papaya to eat before being escorted around the village. About 600 people live on the island and make a living by fishing and boat-building. They were extremely friendly and quite happy to be photographed without requiring payment in advance. The immediately viewable image on the small screen of Jan's digital camera was of great interest, particularly to the children.

I had set myself a target of 1,500 QSOs during the week, but found that I had only made just over 1,050 by the start of our last day. I'm afraid that I made myself rather unpopular with Jan by spending too much time on the radio on the last day, but I did bring the final total up to 1,345, the last 200 or so being very slow going indeed, with many unanswered CQ calls.

Despite daily enquiries of the Travel Collection's representative, retrieving the original license document from Male proved impossible and I was able eventually to collect it at the airport just prior to checking in for the return flight.

The breakdown of QSOs by band and DXCC entity went like this (band/QSOs/DXCC): 30/1/1, 20/63/12, 17/314/35, 15/707/57, 12/260/32, all/1345/71.

Special QSL cards have been printed and are available from either my *Callbook* address with return postage and SAE or via the RSGB bureau. I have been particularly surprised at the number of direct requests already received from Japanese stations.

My particular thanks go to my XYL Jan; Abdullah Rasheed, Director of Engineering at the Ministry of Communication, Science & Technology; and Anthony Perera, General Manager of the Velidhu Island Resort and his most friendly and courteous staff, without whose help and cooperation this operation would not have been possible.

Carl Markle K8IHQ
11570 Taylor Wells Rd.
Clairdon OH 44024-8910

Easy-Build Project of the Month

This time: 400 kHz AC low pass filter for 120 VAC 60 Hz line filtering.

Tired of the neighbor's noise generators messing up your TV and stereo receiver? Or maybe Mama using her kitchen mixer or the like when you are trying to work that weak DX station over the S-9 noise level? Well, you get the idea of what this filter can do for you. It also has a fuse and surge protection MOV device to provide maximum usefulness.

The filter is basically a 400 kHz and below low pass filter. Since it is a common mode design it is equivalent to a toroidal bifilar-wound indicator. In short, it cancels noise and inrush current and voltage spikes between the neutral and power lines. The slugs of energy developed are then capacitive-coupled to the common ground return back to the circuit breaker power distribution box.

A nice side use is in the bathroom or where GFI ground fault interrupter devices are used. We know these devices are real noise makers but are required if power is within six feet of water or plumbing. If you like a radio in the bathroom when soaking, the GFI will keep you safe and the filter will reduce the GFI noise to a tolerable level (or maybe completely). AM stations may still have some interference, but the FM stations sound pretty good.

This filter device can also be used on 240 VAC if a double-wide enclosure is used and two filter assemblies are enclosed. The MOV should be either a 130 or 150 VAC device. The Pulse Engineering dual-common-mode 8.2 mH choke is rated at 5 amps 250 VAC. The windings are about 0.2 ohms each.

See **Fig. 1**, the schematic, and **Photo B**, the assembly photograph, to get a better idea of what the filter system looks like.

Another application that was found was for DC use. Your 6 V or 12 V wall converters or mobile automotive 14 V battery system can be filtered dramatically with this filter. Make sure you change the MOV to handle the DC trip levels. Generally the AC-specified device has a 60% increase in the trip point level with DC use. An example is the 5 VAC MOV, which has an 8 VDC specification. I often use two 5 VAC devices in series to form a 16 VDC device for use with a 14 VDC battery system. When used in a DC application, make sure you do not exceed that 5 amp current limit of the dual choke. The internal bobbin wire is still limited on current.

In a DC application, you can put the +V source on one winding and the -V on the other winding. The ground can be connected to the grounding point on the equipment system. In the case of wall converters, the capacitors have no real effect. Only the dual choke comes into play. Digital equipment generates large amounts of noise on the DC

lines, so filtering from the wall converter is very beneficial. It not only isolates noise from entering the instrument, but also keeps noise from being placed onto the 120 VAC lines. This is especially useful to keep your rig's RF off of the power lines. Only the radiated RF will need to be dealt with in that case.

The component sources are listed at



Photo A. Make sure the lid markings indicate that this is not for exterior use.

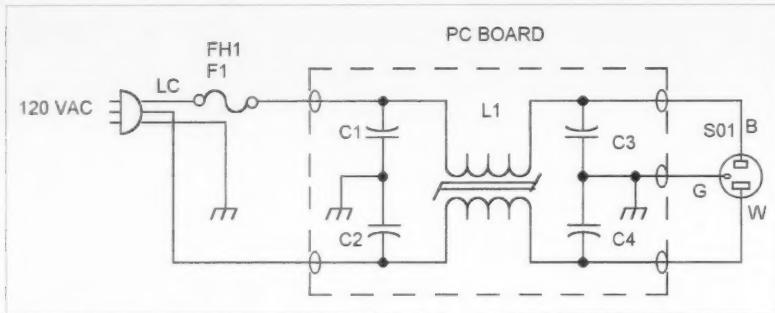


Fig. 1. 400-kHz AC Line Filter schematic.

the end of this article. Hosfelt Electronics can provide the Pulse Engineering PE-96180 dual choke for about 35 cents and the AC box capacitors at about 5 cents each. This is a good deal! They also have MOV and fuseholder devices, as do other sources including your local Radio Shack retail store.

The line cord and strain relief can be purchased from these sources as well as your local home improvement centers. I recommend using AWG-18 hook-up wire to the NEMAL receptacle. Four nylon low standoffs can also be purchased from Hosfelt Electronics at reasonable prices. The PC boards are available from FAR Circuits at \$4.00 each plus S/H \$1.50. This is quite a bargain for high-quality FR4 glass boards that are silk-screened with component information. The S/H charge covers up to four boards, and I do recommend purchasing more than one board.

I used a standard gray PVC 2x4 outdoor enclosure and lid at about \$6.00 from your local home improvement store in the electrical department. Using a 5/8" Forstner drill bit, the fuse hole and NEMAL socket/receptacle hole can be cut easily. Use a coping saw or saber saw to cut the square hole for the NEMAL socket. Clean up and square off using a double-cut file. Snap in the socket, then use a little clear 100% silicone caulk on the rear side to provide a secure attachment to the lid. It must be safe and secure, since we are fooling around with 120 VAC and National Electrical Code (NEC) requirements apply. Make sure that your line cord is a three-pronged NEMAL-type, or the filter will not work properly. Mount the circuit board in the enclosure bottom using the silicone caulk on the four nylon standoffs or nylon screws.

I did decide to use an indelible ink pen, sometimes called a felt marker, to

mark the fuse rating and label information. The marking pens are available from your local post office at \$1.00 each — what a deal!

One word of caution. This is not for exterior use. It is neither watertight nor GFI-protected. Make the lid markings indicate accordingly.

For those who think two are better than one, I found that two filter stages in series did not justify the additional cost. One filter does it just fine! Now, on to the next project!

Sources

1. Hosfelt Electronics, catalog: 1 (800) 524-6464.
2. FAR Circuits, 18N640 Field Ct., Dundee IL 60118 ("K8IHQ Filter").
3. Local: home improvement store or electrical supply.

73

Qty.	Name	Description	Source	Cost
1	PCB	Printed circuit board	FAR Circuits	\$4.00
1	Box	PVC electrical box	Local	5.00
1	Cov	PVC box cover	Local	1.00
1	FH1	Fuse holder 3AG	Hosfelt 43-206	.75
1	F1	Fuse 5A 3AG	Hosfelt 31-050	.10
1	S01	AC receptacle NEMAL 3-prong	Hosfelt 21-365	.65
1	L1	Dual 8mH 5A choke (PE-96180)	Hosfelt 18-129	.35
			Mouser #5989-250V.1	.26 ea.
4	C1-4	0.1 μ F 250 VAC box cap	OR	
			Mouser #539-158X104	.66 ea.
1	Z1	130 VAC MOV (20mm)	Hosfelt V130LA-20B	.59
1	LC	Line cord (3-prong) NEMAL	Hosfelt 60-370	1.75
1	SR	0.5 in. strain relief	Local	.20
4	—	0.5 in. nylon standoffs 6-32	Hosfelt 28-149	1.00
4	—	0.25 in. nylon screws 6-32	Hosfelt 28-128	.40
Total				\$15.99

Table 1. Parts list.

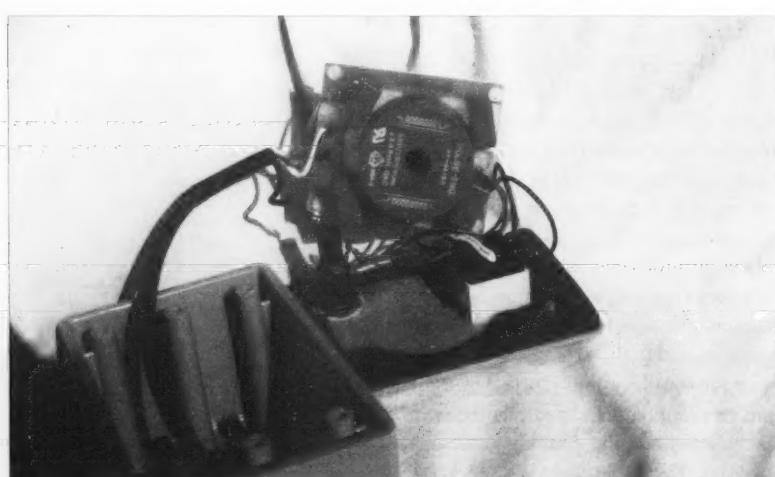


Photo B. A view of the filter system assembly.

Wallace Edward Brand;
Malcolm Watts, N.Z.C.E.; and
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Tesla: Inventor of Radio and Modern-Day AC

(Marconi and Edison notwithstanding.)

Popular beliefs in history are often not factual and cannot bear scrutiny. Such is the case for the history of electricity, which ultimately led to radio.

From the time man started his upward march toward an advanced technological society, only a few exceptional scientists have left indelible marks. Nikola Tesla was one of those few. Born in 1856 of Serbian parents in what was once the great Austro-Hungarian Empire, and educated at the Austrian Polytechnic School in Graz, he emigrated to the United States in 1884 and became an American citizen.

Tesla brought with him the secret of how to unleash an awesome power never imagined by his contemporaries ... the power upon which, today, the entire world runs ... polyphase alternating current (AC).

The illnesses Tesla suffered during his childhood almost killed him. Later, as an adult, the ridicule and rejection he suffered, after showering the world with many of nature's most elusive secrets, were severe enough to stifle most men, yet he remained dedicated to science. The great German philosopher Arthur Schopenhauer probably said it best when he stated: "All truth passes through three stages: First, it is ridiculed; Second, it is violently opposed; and Third, it is accepted as self-evident."

Such is the story of Nikola Tesla and his struggle to make AC the world standard. His rotating magnetic field principle, basic to all power generation and electric motors, is as eternal as the wheel. Indeed, it has become as common as the wheel, and without it, the world would be quite different.

The story of the rise of electric power is long, and no one man should have exclusive credit for its creation. Others, such as Hans Christian Oersted and Michael Faraday, made significant discoveries in electrical science. Their discoveries of electromagnetism and electromagnetic induction, respectively, were pivotal breakthroughs; without them, Tesla would not have been able to unleash the awesome power contained in the electrical genie Faraday discovered in 1831.

For 51 years after Faraday's discovery, investigators struggled to increase the electrical output of Faraday's embryonic generator. Gradually, magneto-electric generators became available, and by 1872 the direct current (DC) generator reached its peak of refinement.

Nevertheless, all such generators proved to be inefficient and troublesome, creating sparks and requiring frequent maintenance. Moreover, DC

power was inherently inferior because its losses increase as a function of the inverse square of the voltage. End-use voltage has to be relatively low for safety reasons. With no inexpensive method of changing the voltage of DC electricity, the voltage of generation, transmission, and distribution of DC power had to be the same as the low voltage of use.

Unless massive copper bars as conductors are used to transmit all the amperes necessary to transmit a large quantity of power at low voltage, it is impractical to distribute DC a distance greater than 1/2 mile from the generating station. With AC power, the relatively inexpensive transformer changes the voltage from high voltage transmission (over pencil-thin conductors) to low voltage distribution ... and use.

Nineteenth-century technologists believed DC power was their only option for harnessing Faraday's discovery. Everyone believed naturally occurring AC was useless ... akin to a perpetual motion machine. Tesla's discovery of the rotating magnetic field principle proved everyone wrong. As the Circuit Court in Connecticut concluded in upholding Tesla's claim of invention against attacks on its novelty, "What

others looked upon as only invincible barriers ... he [Tesla] brought under control, and ... taught how to utilize in practical motors in distant cities the power of Niagara" [Westinghouse Elec. & Mfg. Co. v. New England Granite Co., Vol. 103, *Federal Reporter*, p. 951, at p. 972 (D. Conn.—1900); affirmed by the Circuit Court of

Appeals, Second Circuit, 110 F 753 (CA2—1901).

After Thomas Edison invented the incandescent bulb, he immediately sought investors to fund the construction of power stations, using existing DC technology to power his lamps. His promoters immediately dubbed him "The King of Electricity," but his

role was strictly as an entrepreneur building larger generators than were already commercially available. Edison's brief foray into the power industry was nothing more than an anomaly, and he contributed nothing to the time line of scientific progress. His much-heralded Pearl Street Station in Manhattan produced the same DC as the much earlier arc-light DC central stations in San Francisco and other locations, so there can be no justification for scientific innovation. DC is merely a historic relic, and even its title does not belong to Edison.

While the rest of the world had their eyes fixed on Edison's promotion, Tesla was searching for a way to prove his AC theories. The answer came to him one day in 1882 as he was walking in a park reciting poetry. The idea appeared as a blinding flash in his mind, and he knew instantly that he had found the missing link in Faraday's great discovery ... how to extract the awesome electrical power contained in Michael Faraday's discovery 51 years earlier. Such was the power of his rotating magnetic field principle. Faraday's "new-born baby" suddenly became a giant in his mind. Moreover, Tesla never realized at the time how difficult a task he would have in overcoming ignorance and greed. Thomas Edison had spent millions of dollars of investors' money to promote existing, inefficient, DC technology, and he was not about to have his empire destroyed.

Tesla worked for Edison briefly, but he soon realized that Edison had fixed interests and that they were strictly entrepreneurial. Tesla had loftier goals, and they did not include wasting his time building Edison's power stations, which perpetuated a limited, inferior technology. He simply could not understand why Edison was unable to comprehend the superiority of his AC system.

George Westinghouse did not suffer Edison's shortsighted mentality. He knew Tesla had solved the energy problem that plagued scientists for more than 50 years, so he bought all of Tesla's patents on the polyphase AC system. Tesla had germinated the AC seed, and now it was the

Syllabus

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA v. THE UNITED STATES

[No. 33842. Decided November 4, 1935]

On the Proofs

Patents; improvements in wireless telegraphy; validity and infringement.—On the questions of validity and infringement of the following patents for improvements in wireless telegraphy, the court held as follows: Marconi reissue patent No. 11913, held not infringed. Lodge patent 609154, held valid and infringed. Marconi patent 763772, held invalid except claim 16, which is held to be infringed. Fleming patent 803684, held invalid and not infringed.

Royalty; construction of contract of sale.—Where a contract of sale to the United States of certain wireless telegraph stations by the owner of patents on the equipment thereof provided that the contract price was for compensation in full to the seller, and that the Government was not bound to pay the seller any further sum as payment, royalty or other compensation "on account of its patent rights involved in any of the apparatus" thereby transferred; the exemption of the Government from payment of royalty on account of such patent rights extended only to the use of the particular apparatus or equipment transferred in the sale.

Party entitled to sue for infringement.—The general rule as to the right to sue for the infringement of a patent is that the right rests with the one who was owner of the patent at the time the infringement occurred.

Infringement of combination.—A new combination of elements, presenting a new arrangement, and producing new and beneficial results does not infringe a former combination by using some of the elements thereof.

Validity of patent; application filed more than seven months after filing of foreign application.—A patent is not invalid under section 4887 Revised Statutes, as amended, because the application therefor was filed more than seven months after the filing of application for a foreign patent unless the invention was also first patented in the foreign country.

When invention "first patented" within meaning of section 4887 Revised Statutes.—As used in section 4887 Revised Statutes, the term "first patented" means the time when the patentee's rights to the patent become fixed and determined, which in Great Britain is the date when the patent is "sealed."

Laches of owner of patent in enforcing rights against infringers; effect upon subsequent owner.—Where there was such laches on the part of the owner of a patent in enforcing its rights against infringers that interested persons might well believe the patent had been abandoned, a subsequent owner of the patent is not

Fig. 1. Excerpt from Marconi Wireless Telegraph Company of America v. the United States, 81 Ct. Cls.

entrepreneur's turn to cultivate the power industry and reap its rewards.

Westinghouse, using Tesla's AC patents, joined with General Electric Company and in 1895 created the Niagara Power Project, the first large-scale hydroelectric generating station in the world. A mere 74 years later, man was walking on the moon. Such was the impact of Tesla's discovery. Now, virtually unlimited electrical and mechanical power is available anywhere.

Is it not classic irony that today our perception of electrical history is so flawed that Tesla's name is largely unrecognized, and we pay tribute to Thomas Edison, the man who fought bitterly to defeat the rise of the polyphase AC electrical power used almost universally throughout the world today? Even our premier museum, the Smithsonian Institution, hails Mr. Edison as the founding father of our electrical power system, and recognizes Tesla only as the inventor of the AC motor. Its curator even attributes Edison's

incandescent lamp as being the catalyst for the second industrial revolution.

It was not the lamp that industry needed; it was the mechanical muscle of Tesla's AC motor and the power to make it run that sparked the second industrial revolution. But the greatest triumph of the polyphase AC system was that its use permitted the integration of utility systems to permit taking advantage of overwhelming scale economies in generation. No more was it necessary to have an isolated generating source for each different use of electric power.

Tesla's intellect was such that once he had solved the AC conundrum, he continued his investigations into the world above 60 cycles (AC) ... high frequency. A few years earlier, the brilliant Scottish mathematician, James Clerk Maxwell, established the laws of electrodynamics by formulating four equations defining electromagnetic theory. He concluded that it is possible to transmit energy by electromagnetic waves at the speed of light.

Later, Professor Heinrich Hertz, in Germany, set out to interpret and prove Maxwell's work experimentally. His experiments proved those postulates — that electromagnetic waves are indeed propagated in air at the speed of light. Maxwell and Hertz had now laid the groundwork for someone to follow in their footsteps and create a system for transmitting and receiving intelligence.

Nikola Tesla was the first to recognize the need to investigate the properties of high frequency alternating currents ... probably because of Edison's attacks on his high voltage AC transmission system as unsafe. The so-called "skin effect" of high frequency reduced its danger; and this work with high frequency electric power led to his system of transmitting intelligence (radio).

Tesla invented a high frequency air core transformer capable of producing high voltages at very high frequencies. It became known as a Tesla coil. In doing so, he discovered the secret of

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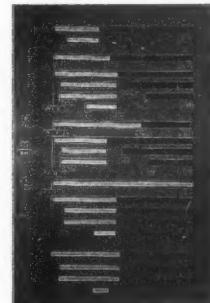
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electrical resonance, a fundamental necessity in all electronic circuitry. Tesla again proved he was both scientist and technologist, someone who could discover new scientific truths that advanced earlier beliefs and then made them work in a practical way. In short, he was the link between the pure scientists and the technologists who followed.

History is not kind to Tesla, although all of us are the benefactors of his creative genius. The main reason his name is not a household word is that he left no industry or family to perpetuate his memory. Nevertheless, his legacy — whether or not we acknowledge it — is all around us in the electricity that powers our homes, schools, and factories, and in the AC motors powering the many machines that make our lives comfortable.

There is an overwhelming belief that Thomas Alva Edison was the chief architect of our electrical society, and that Marchese Guglielmo Marconi was the inventor of radio. Nonetheless, there is indisputable evidence clearly showing that Nikola Tesla was not only the father of polyphase AC electricity transmission, but also the father of radio.

Litigation again is helpful in establishing priority of invention of radio, just as it did for polyphase AC transmission. The granting of a patent, by itself, is not wholly determinative of invention because that is an *ex parte*, or one-sided proceeding. Usually no one is opposing its grant with facts (outside those readily available to the patent examiner), tending to show that the claims of the patent applicant were unwarranted. The patent examiner is some help in avoiding grants based on unwarranted claims of invention, but his study is limited to papers on file in the patent office or available to him without great effort and expense. Even concerning those, he is frequently dependent on the honesty of the lawyer for the applicant in bringing prior art to his attention.

In the case of radio, as well as electric power systems, two-party patent litigation, and sometimes other litigation, fortunately is available to help in

determining priority of invention. Such litigation with respect to radio came to the U.S. Court of Claims when Marconi filed a claim against the government for the taking of his intellectual property involved in four patents: two claimed to be invented by him, one in which the claimed inventor was Sir Oliver Lodge and assigned to Marconi, and one by J.A. Fleming, also assigned to Marconi.

Four patents were involved. The first was a patent by Marconi for a two-circuit system for transmitting signals and receiving them remotely with one circuit in the transmitter and one in the receiver. A current analysis by an expert in electrodynamics (below) shows that this was not a viable system of radio communication.

The two-circuit patent was Re-issue No. 11,913 (Original No. 586,193), granted to Guglielmo Marconi on June 4, 1901, for transmitting electrical impulses and signals and the apparatus therefore.

The second patent was for a four-circuit system of wireless telegraphy, No. 763,772, granted to G. Marconi on June 28, 1904. This patent is the key to the invention of radio. The question for the court was whether the patent was properly issued to Marconi, who claimed to be its inventor, or whether its issuance was invalid because of prior art.

The third patent at issue was No. 609,154, for the use of a variable inductance in tuning a circuit to resonance with another, granted to O.J. Lodge on August 16, 1898; and the fourth patent was for a rectifier tube, No. 803,864, granted to J.A. Fleming on November 7, 1905. The total damages claim was for \$6,000,000 — which in 1916 was a lot of money — and justified full development of the facts by the parties to the litigation.

The findings of fact and opinion of the lower court (Court of Claims) can be found in *Marconi Wireless Telegraph Company of America v. The United States*, 81 Ct. Cls. 671 (1935), affirmed in major part by the Supreme Court 320 US 1 (1943).

The Court of Claims decided that the government did not infringe on

Marconi's two-circuit patent. The government's suppliers had not used that technology because long before World War I, it was already obsolete. It held that each of the components Marconi utilized in the two-circuit system was invented by others, but that possibly the combining of them justified a claim of invention for the two-circuit system (even though it was not a viable system of radio). Moreover, the four-circuit system had revolutionized the art. Clearly, the focus of the litigation in the Court of Claims was on the four-circuit patent.

During the more than three years after Marconi's initial filing of the key four-circuit patent on June 28, 1904 was rejected for prior art, new applications and petitions for revival were filed and rejected by reason of the prior art set forth in the Braun British patent, Lodge No. 609,154, and Marconi No. 627,650, but principally in Tesla No. 645,576.

In the early 1930s, the Court of Claims carefully analyzed Marconi's claim of invention of the four-circuit system. Its examination showed how patent office examiners time and again rejected Marconi's claim on the four-circuit system due to Tesla's prior patent for the identical apparatus, his "prior art." It held that it was not necessary even to consider the Stone claim, which was prior to Marconi's but after Tesla's, because Stone himself credited Tesla with its invention. [John Stone (1869-1943), one of the many early pioneers of radio, gave Tesla full credit for its invention.]

At long last, Marconi had persuaded the patent office to reconsider and grant the patent. Was it only by coincidence that this occurred just after the influential investment banker, Morgan, gave his backing to Marconi? Both the Court of Claims, and later the Supreme Court, in affirming the decision of the Court of Claims, remarked that the first examiners were correct, and there was no apparent justification for the *volte face* of the last examiner who granted Marconi the invalid patent on the four-circuit system (opinion of the Court of Claims on Liability, 81 Ct. Cls. 671, 760 to 768).

"It is sometimes said [by those denigrating Tesla's invention of radio] that Tesla's purpose was only to transmit electrical energy, but the electrical waves transmitted by any wireless system are merely one form of electrical energy. Moreover, the specification of Tesla's patent recited that the method of energy transmission would be useful when it was desired to transmit intelligible messages to great distances. In view of this statement, it is within the knowledge of those skilled in the art to interrupt the continuous generation of high frequency energy in the transmitting system by a telegraph key, and substitute for the current receiving instrumentalities disclosed in connection with the receiving system, a radio signal detector device."

The only thing left is to determine of what significance is the Court of Claims' marginal award of invention to Marconi for the two-circuit system.

First, the government's lawyer claimed that Marconi's two-circuit system was basically the same system used by Hertz to verify the theories of James Clerk Maxwell. Brief at 41.

Second, this is what Marconi's own lawyer said of the two-circuit system: "Marconi, in 1894, learned of the Hertz 1888 experiments and in 1896 filed an application in the United States, upon which was granted the patent which was reissued as 11,913. That patent, formerly in suit, described a sending station and a receiving station without any tuned circuits. This system would operate, but only at short distances, because there was too much waste of energy. The transmitting antenna would quickly, and not persistently, radiate the energy applied to it, with the result that the train of ether waves would be too short instead of being sustained. And at the receiving station, the antenna likewise would quickly absorb the received waves, instead of storing them up, and the antenna also would receive undesired waves from other transmitting antennas [citations omitted]. The Lodge patent formerly in suit was an improvement; both the transmitting and the receiving antennas being tuned with inductance, so that each would vibrate longer and

the receiver would be more selective (inductance in an electrical system is the same as inertia in a physical system). Moreover, even with the Lodge patent, signaling only to short distances, about eighty miles, was all that was possible before the invention of the [four-circuit] system which enabled communication in 1901 over a

distance of more than 6,000 miles [citations omitted]." Brief for Petitioner and Cross-Respondent, March, 1943, at p. 16.

According to the Corum brothers, who are prominent experimenters with Tesla coils, "Tesla's stroke of genius was to use tuned coupled coils, move the energy storage capacitance to the

81 C. Cls.] MARCONI WIRELESS TELEGRAPH Co. v. U. S. 677

Reporter's Statement of the Case

Marconi reissue #11913 and Lodge #609154, and assigned these patents, together with all claims for profits and damages by reason of past infringement, except for the same reservation previously mentioned.

These three assignments, being exhibit 362, are by reference made a part of this finding.

MARCONI REISSUE #11913

IX. The reissue patent #11913 relates to a—

"complete system or mechanism capable of artificially producing Hertz oscillations and forming the same into and propagating them as definite signals and capable of receiving and reproducing, telegraphically, such definite signals; * * *."

The embodiment shown by figs. 10 and 11 of the patent, reproduced below, is the basis of the alleged infringement.

Fig. 10.

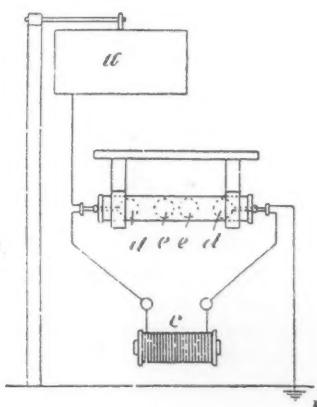
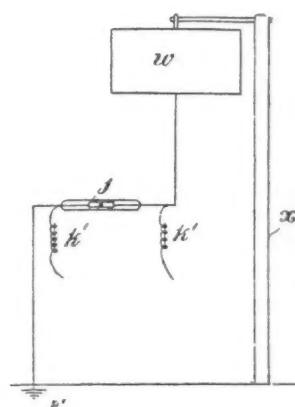


Fig. 11.



To one skilled in the art a transmitting station is shown at fig. 10, having a Morse key and battery in the primary circuit, not shown, of an induction or Ruhmkorff coil *c* or other source of high tension, high frequency current. A spark gap *d, e, d*, in the secondary circuit has one side grounded at *E* and the other side connected to an elevated wire and plate *u* insulated from the earth on the pole *v*.

The receiving station in fig. 11 has a coherer or imperfect electrical contact type detector *j* connected on one side to an elevated conductor *w* insulated from the earth, while

Fig. 2. Another excerpt.

primary side, and to add a ground connection. Tesla was the first to inductively couple the secondary circuit [where the capacitance must be small] to a tuned primary circuit, where the energy storage element [capacitance] may be huge by comparison. This remarkable innovation made possible the generation of RF signals immensely more powerful than Hertz's apparatus [and therefore the apparatus in Marconi's reissue patent] (*TCTUTOR* at page 13. J&K Corum, D. Edwards, Corum & Associates, Windsor, Ohio, 1988, ISBN 0-924758-01-5). According to the Corums, Hertz calculated his peak power at 16 kW. They concluded that his average radiated power was trifling. In contrast, at Colorado Springs, in 1899, Tesla's average power was in excess of 250 kW and his peak power exceeded 76 megawatts — a long way from Hertz in just a decade. *Ibid.*

Third, even Justice Frankfurter, who dissented bitterly in favor of Marconi, acknowledged that the two-circuit patent was not a significant factor in the innovation of radio: "That patent did not embrace many of the crucial claims here involved and its product cannot compare in commercial usefulness with that of the patent in suit." 320 U.S. 1 at 64, footnote 3.

The following technical evaluation will clearly show the unviability of the two-circuit system as a means for transmitting intelligence:

(1) Abstract. This work examines the characteristics of the two-circuit radio transmission and reception system (Patent Re-issue No. 11,913) used by Marconi prior to the development of the four-circuit system. The findings are that the circuit as described in the named patent is an unviable system of radio communication owing to a number of drawbacks (to be examined in detail). In particular, findings include a wide inherent bandwidth in the system (consider the implications of this in the usage of today's radio frequency allocations) and limitations on the signal and receptive power of the system as described in the patent (affecting coverage and transmission distance).

(2) Transmitter Characteristics (and their implications). The circuit

diagram of the transmitter [Marconi Wireless Telegraph Company of America v. The United States — Fig. 10, 81 Ct. Cls. at p. 677] shows a conducting plate (u) suspended by insulating pole (v) to which is attached a vertically hanging wire connected to one end of spark gap (d,e,e,d). The other end of the gap is connected by a wire to earth. Across the spark gap is connected an AC power source (c) (see Fig. 2).

Observations

It is not obvious from the diagram of Marconi's two circuit apparatus (reproduced in the court's findings of fact) at exactly which point along the total length of the wire the spark gap is connected. This may have an influence on the resonant mode of the system (due to impedances associated with the power supply with respect to ground), but it is also true that any monopole resonator such as this will respond to a number of frequencies. (This is easily demonstrated both by doing a frequency sweep of such a circuit using a sweep generator and spectrum analyzer, and is also shown in graphic detail in a simple mechanical system — a metal ruler standing in a vise is an example of such a resonator.) It is assumed that the dominant 1/4-wave mode is being used.

Consequences

A conflicting set of requirements arises from the desirability of the system to be narrow band (selective) on one hand and a good radiator on the other. This is not necessarily an impediment to a good narrowband transmission (the antenna used in the typical AM station is unchanged except for the lack of a top-loading capacitance), and in modern radio stations the signal fed to the antenna is rigorously controlled with regard to frequency content.

In the transmitter in question, this is not so. The signal is generated by connecting a charged capacitance (upper wire + plate) to earth by a spark gap which conducts when the breakdown potential across it is

reached. Conduction in the gap takes place extremely rapidly (spark propagation of up to 10^8 cm/s) [*High Power Electronics*, Sargent & Dollinger, pub. TAB Books, Inc., ISBN 0-8306-9094-8, Ch. 6.1, pp. 187-190] and is essentially a step function. The result is the generation of a broad spectrum of frequencies whose harmonic content and harmonic amplitudes may be described by a Fourier Series or similar [*Advanced Engineering Mathematics*, 5th Ed., Erwin Kreysig, pub. John Wiley and Sons, ISBN 0-471-88941-5, Ch. 5.3, pp. 211-216], all of which are available to excite the antenna in many resonant modes additional to the 1/4-wave fundamental.

The Q of a circuit containing a spark gap has been seen to be a severe limiting factor on the performance of resonators generally (particularly high Q ones — however, any unwanted losses in a radiating circuit that do not contribute to the radiation are undesirable). Not only does the gap dissipate energy (that could otherwise be usefully employed in radiation), but in extinguishing at low currents it suppresses further oscillation in the antenna before all energy in the circuit has been usefully employed.

Finally, the top capacitance is used as the primary energy store in the two-circuit system. Available system energy is described by the equation $E = 0.5CV^2$. To maximize transmission power, this energy must be maximized. An obvious ploy to increase available energy is to increase the voltage (V), because not only does energy scale as voltage squared, but antenna capacitance must be kept low enough to enable working at a desired frequency with good radiation efficiency. The geometry of the electrode dictates the voltage it can be charged to, and high voltages demand a large radius of curvature for the energy storage capacitance. It is clear that there are limitations on increasing both capacitance and voltage in this system.

Transmitter summary

In this transmitter, the sole resonant circuit is being asked to do two jobs with conflicting requirements. While

radiating efficiently, it is also required to achieve a high degree of harmonic suppression. The four-circuit system gets around this by separating these functions into two separate loosely coupled circuits, each performing a single function. Any circuit containing a spark gap has a very lossy harmonic generator built into it. Efficiency is not restricted to signal radiation alone, and the resonator (antenna) in this system is excited at a multitude of frequencies resulting in a wideband transmission. In the four-circuit transmitter, the gap is removed from the antenna circuit and incorporated into separate circuits, the degree of coupling between them defining the bandwidth of the circuit until the gap is quenched. Ideal quenching results in a single frequency output, a fact well known in early radio circles. This scheme, when used with close coupling, allows energy transfer from primary circuit to antenna to be effected with very few gap conductors ... and hence, losses.

The four-circuit system still suffers gap losses but enables the gap to be quenched (removed) from the antenna circuit while still allowing the antenna to ring at its natural frequency with better efficiency. The moment the gap stops conducting in the two-circuit system, all oscillations cease. There is a serious problem when trying to increase power in the system to a level suitable for long distance transmission. The requirements for the capacitor (u) to be small for radiation efficiency and large for energy storage clash badly. The voltage the capacitor can be charged to is limited by its size and shape — hence transmission power is also restricted. The four-circuit system overcomes this by allowing use of arbitrarily large primary storage capacitance charged to arbitrarily high voltages in a compact manner. Primary energy storage is removed from the aerial system.

(3) Receiver characteristics. The receiver circuit appears in Fig. 11 (Marconi Wireless Telegraph Company of America v. The United States, 81 Ct. Cls. At p. 677), shown in **Fig. 2**. Once again, a lossy element (coherer) appears in the antenna resonant circuit,

losing energy and widening the antenna frequency response. The degree of coupling between the two resonant circuits in the four-circuit system defines overall system response and removes the lossy coherer from the antenna.

With that technical evaluation of the two-circuit system as background, we can turn to two portions of the Supreme Court opinion that are sometimes cited as preserving Marconi's priority of invention.

First, a sentence in the majority opinion at page 37. The sentence reads: "Marconi's reputation as the man who first achieved successful radio transmission rests on his original patent, which became Re-issue No. 11,913, and which is not here in question." The pronoun "which" has an ambiguous antecedent. It is not clear whether the matter "not here in question" is Marconi's reputation, or the validity of the two-circuit patent, Re-issue No. 11,913. It appears to the writer that it refers to the latter, which was not in issue because neither party sought review of the Court of Claims decision on the reissue patent since there had been a finding of no infringement. But even if it refers to the former, the statement would have significance only if the combination by Marconi of the elements invented by others played an important role in the progress of radio; and as it has been shown above, it did not. The two-circuit system could only transmit a few miles without the Lodge improvement, which increased the range to 80 miles. In contrast, the four-circuit system could reach 6,000 miles and lessened interference of other transmitters. The two-circuit system transmitter was identical to that of Hertz. The receiver merely substituted a coherer — invented by Branly — in the Hertz receiver, in lieu of the spark gap used by Hertz for experimental purposes.

The second citation is to the dissenting opinion of Mr. Justice Frankfurter. He commenced his dissent by pointing out the inadequacy of lawyers, such as himself, to follow a technical discussion. 320 U.S. 63, footnote 1. It is clear that he found it difficult to understand

the facts, because he failed to cite a single one in support of his view that those prior in time to Marconi "did not have the 'flash' ... that begot the idea in Marconi which he gave to the world through the invention embodying the idea." Perhaps it was for this reason that he failed to persuade the majority. Just as in any other profession, lawyers and judges apply principles to facts to draw conclusions. The majority applied legal principles to facts and found that Tesla invented radio. Justice Frankfurter apparently reached the conclusion in his dissenting opinion in some other way.

Guglielmo Marconi deserves great credit for his vigorous promotion and business development of wireless telegraphy and radio, just as credit for promoting the polyphase alternating current system belongs to George Westinghouse — not the inventor, also Nikola Tesla.

Marconi evaluated the commercial opportunities arising from the inventions of Hertz and Tesla, and seized them. When Hulsmeyer, the inventor of radar, tried to sell his invention to shipowners, he had no success. Being a shrewd businessman, Marconi tied his customers with contracts so tight in exclusive dealing arrangements that shipowners were fearful of dealing with others to install radar systems for safety purposes because the systems also used Hertzian waves. "The very fact that all reports and documents referred to Hulsmeyer's [radar] discovery as based on a form of wireless telegraphy was enough to convince them [shipowners] that it was one and the same thing, however different its use, and shipping lines using wireless telegraphy in its accepted sense were mostly under contract to the Marconi monopoly. The terms of the Marconi License were strict and no one in those competitive times would dare risk a suit for breach of contract" [bracketed material added] (Pritchard, *The Radar War*, Thorsons Publishing Group, Wellingborough, Northamptonshire, NN8 2RQ, England, 1989, at p. 19).

Being a good businessman, Marconi

Continued on page 57

Hugh Wells W6WTU
1411 18th St.
Manhattan Beach CA 90266-4025

Mt. Wilson Travelogue

Join this private tour of one of America's most famous observatories.

Hams are a curious bunch. They have an interest in many things — particularly scientific ones. For this exploration a group of hams joined a group of nonhams for a total of 18 persons. The nonhams were primarily amateur machinists enjoying everything mechanical.

Hams participating in this event were Norm K6YPD, Johnny WB6HYR, Tom N6DGK, Pat KA6TRK, Warren KE6LEA, John KM6JV, Hugh W6WTU, and Mike (call not available).

Photo A shows four of the hams posing for their picture. Photos were provided by Norm K6YPD, Hugh W6WTU, and Johnny WB6HYR, who

provided the majority of those shown here.

For this trip, we toured the Astronomy Observatory located on the top of Mt. Wilson (CA). The observatory is at 5,100 feet above sea level overlooking Los Angeles County. Warren KE6LEA made the arrangements for us to have a privately conducted tour of all the facilities.

Mt. Wilson is named after Benjamin Davis Wilson who was a pioneer trapper and settler (see **Photo B**). He blazed a trail to the top of the mountain in 1864, after which the mountain was named Wilson Peak and later changed to Mt. Wilson.

Adjacent to the observatory is the site of all the TV transmitters serving Los Angeles County. Yes, this is RF Hill and our handheld radios did experience some desense from time to time. **Photo C** shows the density of the transmitting antennas located on the site.

While we were waiting in the parking lot for all of our tour group to arrive, we had a chance to investigate our surroundings. Located in the parking lot was a huge microwave horn that



Photo A. Some of the hams participating in the visit. From L to R: Norm K6YPD, Hugh W6WTU, Tom N6DGK, John KM6JV.



Photo B. Bronze tablet erected for Benjamin D. Wilson.

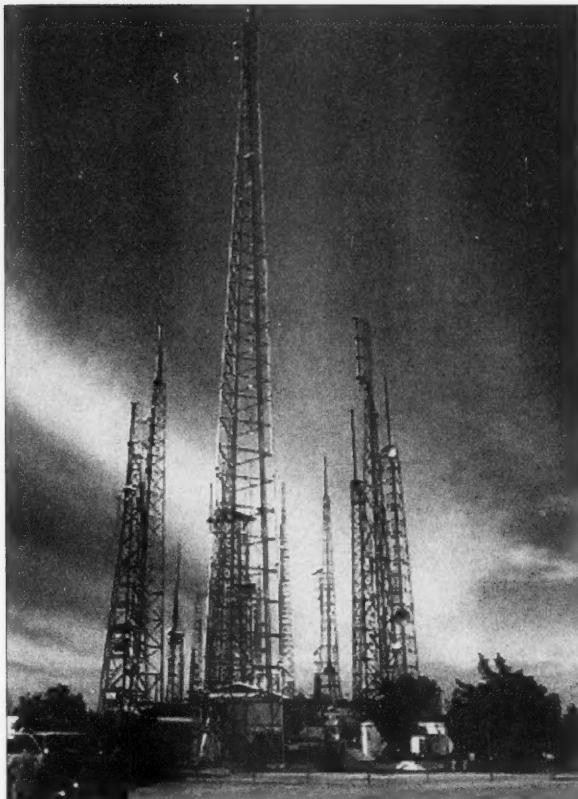


Photo C. TV and FM broadcast antennas serving the Los Angeles metropolitan area.

appeared to have served its time and had been relegated to the parking lot for storage (**Photos D and E**). Although I didn't measure the waveguide dimension, I did estimate the circular guide dimension to be three inches in diameter. It is my estimate that the antenna was designed to support signals in the 3-GHz band.

Although the radio equipment on the mountain was of interest and the TV antennas captured our attention, we were there to visit the observatory. Our tour docent for the visit was Don Nicholson (see **Photo F**), who had been associated with the observatory since he was a small child — his father worked on the site during the early years.

The word observatory might tend to lead you to believe that there is only a single observatory on the site, when in reality there are over eight. All are active and operated by astronomy research groups from all over the U.S. The reason for the congregation of

observatories is because the site is considered to be the "best seeing site" of anywhere in the U.S. At 5,100 feet, the telescopes are above the light field generated by the metropolitan area below and very little or no light aberration is experienced.

One interesting fact was brought out during the tour: For a great many years, astronomy was considered to be a "man's field" and women were not accepted as observers until the 1950s era.

One of the first "large" telescopes was a 60-inch parabolic reflecting

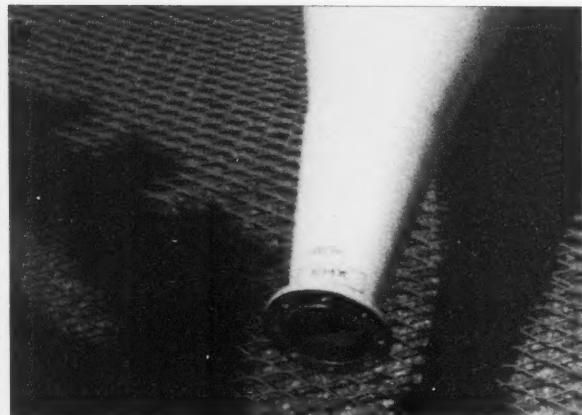


Photo D. Circular waveguide for the 3-GHz antenna.



Photo E. 3-GHz waveguide horn antenna lying on its face in the parking lot.

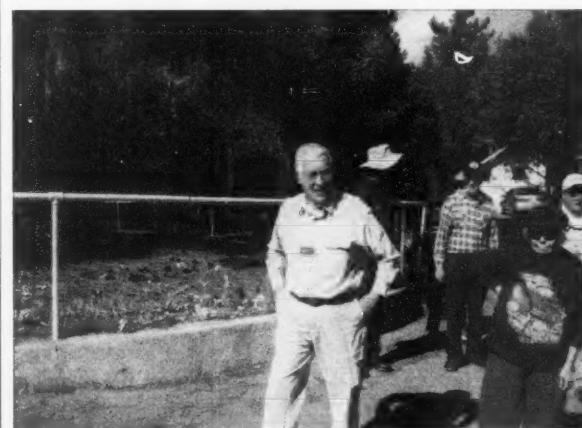


Photo F. Don Nicholson leading the group for a tour of the Mt. Wilson observatory site.

scope and it was placed on Mt. Wilson (see **Photo G**). This particular telescope was one of the first designs providing mounts for both visual viewing lenses and for cameras. Several

scope and it was placed on Mt. Wilson (see **Photo G**). This particular telescope was one of the first designs providing mounts for both visual viewing lenses and for cameras. Several

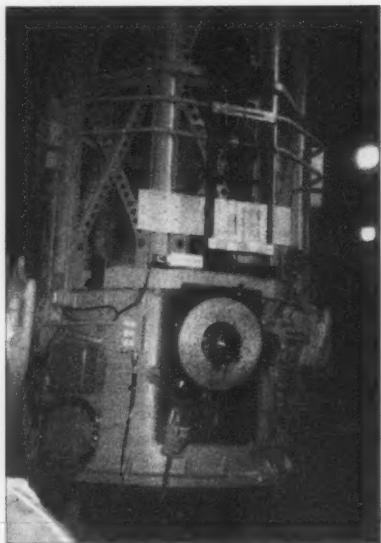


Photo G. Partial view of the 60-inch parabolic reflecting telescope located at the observatory on Mt. Wilson.

"second" mirror options were made available for installation on the upper portion of the structure to accommodate most any viewing requirement. Currently the 60-inch scope is the only one on the site that is available to the public for lease by the night.

In 1917, a 100-inch reflecting telescope

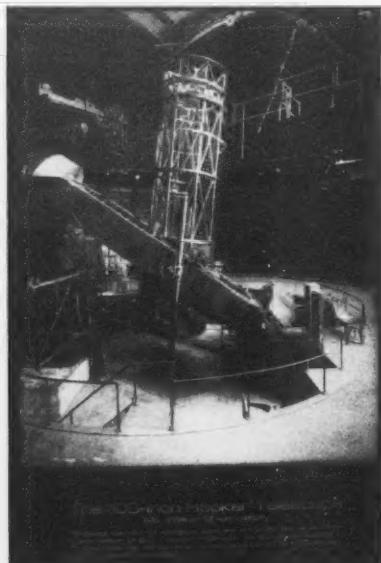


Photo H. The 100-inch Hooker telescope. Photographs made with this telescope can reveal stars so faint they are no brighter than an ordinary candle at a distance of 8,000 miles. Completed in 1917 and remained the largest of its kind for 30 years.

40 73 Amateur Radio Today • April 2002

(Photo H) was developed and installed on Mt. Wilson following the design of the 60-inch. Years later a 200-inch telescope was built and installed at Mt. Palomar near San Diego.

One of the most recent telescope developments on the Mt. Wilson site was designed and is being built by Georgia State University and is called "The Chara Array" (see **Photo I**). I found this telescope to be very fascinating because it is the equivalent of a huge parabolic lens 350 meters in diameter creating a collimating image profile with an infinite focal length. The design utilizes six telescopes positioned in the form of the letter "Y" with two telescopes per leg. The telescopes in each leg are at different spacing to reduce or prevent a redundant image. All six scopes are linked together with evacuated light pipes with a resulting optical image accuracy within a fraction of a wavelength. "Viewing" from the Chara Array is performed by a computer.

Mt. Wilson has many historical events locked up in its closet, with the "secrets" being revealed only to those who venture into the realms of the observatory.

Here is one of the many historical events recorded for the site. During the 1924-1926 period Professor Albert A. Michelson measured the velocity of light from the Mt. Wilson site using a rotating mirror (see **Photo J**). The accuracy achieved was 4 km/s, and that was better than any previous measurement. The previous accuracy obtained by others in 1906 was 10 km/s. Michelson's record stood until 1950, when Esser in England achieved an accuracy of 3 km/s.



Photo I. Two photos of "The Chara Array." The lower photo shows some of the in-process pictures during construction.

To make the measurement, Michelson had a reflecting mirror placed 22 miles away on Mt. San Antonio, providing a total light path of 44 miles. Surveying teams verified the distance to an accuracy of a small part of a cm. After making the measurement, the joke became, "Now that we've measured the velocity of light, we question the length of the meter!"

Michelson's rotating mirror was spun using compressed air, causing it to scream loudly. Michelson used a tuning fork as his "standard" for determining the speed of the mirror's rotation. By the way, the force of gravity was measured and recorded at the test site should gravity have an effect on light velocity.

Another aspect of the visit to Mt.



Photo J. Bronze tablet erected on the pier where Prof. Albert Michelson measured the velocity of light to an accuracy of 4 km/s.

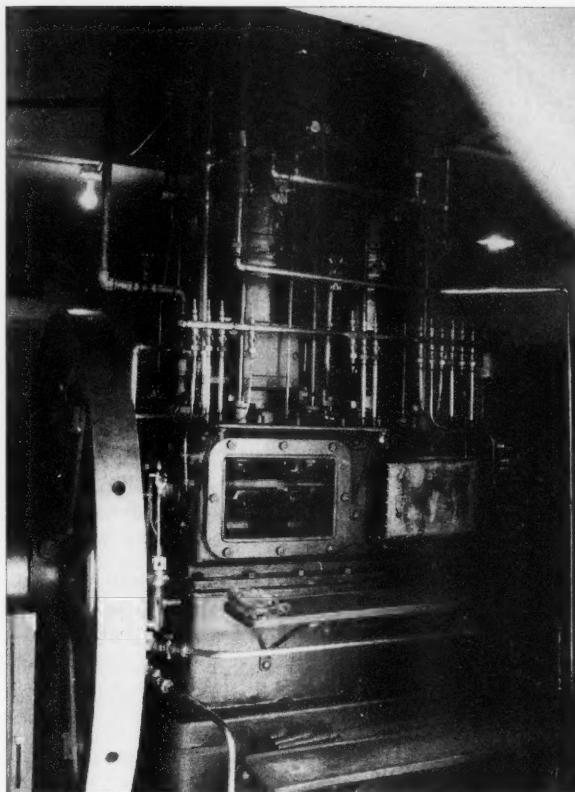


Photo K. 1912 Fairbanks-Morse 2-cylinder 50 HP engine formerly used to drive a 40 kW 120 VDC generator. Most of the Mt. Wilson observatory equipment was powered by 120 VDC.

Wilson was the demonstration of a Fairbanks-Morse engine which had been installed in 1912 (see **Photo K**). At that time the observatory site was designed to run on 120 VDC. The Fairbanks-Morse engine drove a 40 kW DC generator (**Photo L**) that was used to charge a bank of batteries during daylight hours. The objective was to operate the observatory at night off of the batteries since the heat from the engine would create light aberrations.

The engine had been dormant for about 35 years after AC power was provided to the mountaintop. However, the observatory continued to operate off of DC power, so a large bank of rectifiers was set up to take over the task and eliminate the batteries.

A volunteer group of three fellows decided to restore the Fairbanks-Morse engine during mid-1999 and it has been operating ever since. The engine is now operated for demonstrations only and it was a very fascinating thing to see and hear operate. The engine was designed to operate on any combustible fuel, but gasoline and kerosene was used mostly in this engine. Details on the engine are as follows:

- 2 cylinders
- 25 HP per cylinder (total of 50 HP)
- Bore is 11 inches, stroke is 15 inches
- 300 rpm
- Shipping weight of 22,000 lbs.
- Two solid cast-iron flywheels at 1,700 lbs. each

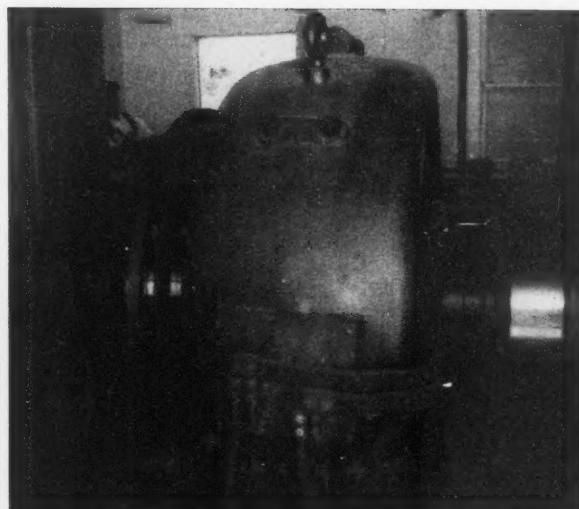


Photo L. Picture of the 40 kW 120 VDC generator being driven by the 50 HP Fairbanks-Morse engine.

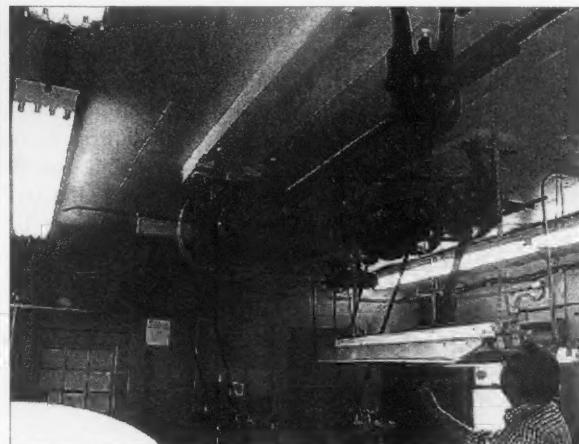


Photo M. The line-shaft used to distribute rotating mechanical power to various pieces of machine shop equipment.



Photo N. The 120 VDC line-shaft drive motor driving a belt and pulley speed reducer.

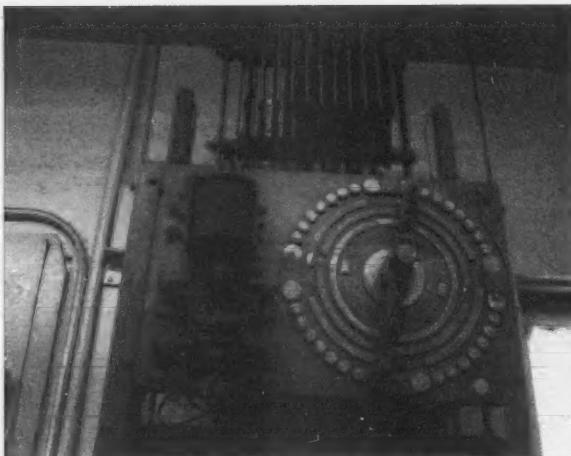


Photo O. Stepped switch rheostat and power solenoid used for controlling the line-shaft drive motor.



Photo P. Ham and machinist tour group entering the Astronomical Museum. Much of the history of Mt. Wilson and observed phenomena is displayed within.

- 8 feet of vertical height
- Displacement was estimated to be equivalent to seven times that of a small-block Chevrolet engine.

I stood beside the engine while it was running and the only noise that it made was the clicking of the external push rods that operated the valves and igniter points — quite an exhilarating treat! To create a spark within the cylinder, a set of mechanical points were mounted inside of each cylinder. At the appropriate time, the points open and a spark across the open points fires the fuel.

After standing beside the engine for a while and being fascinated by the smoothness and silence of operation, I went outside of the building to listen to the exhaust. The sound emanating from the exhaust stack was considerably

different from that heard from a typical gasoline engine. The best way for me to describe the sound is with a “hoof-hoof-hoof” instead of the sharp “crack” with each cylinder firing one hears from a gasoline engine.

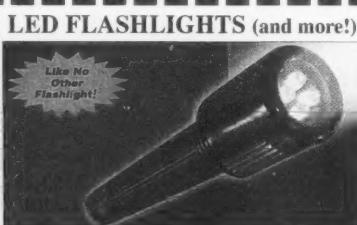
Following the original installation of the engine on the observatory site, people living on the mountain were provided with hot water during the daytime. Cooling water for the engine, after passing through the engine, was routed through the local shower so that people could bathe in warm water. Apparently the engine provided the only hot water on the mountaintop during those early years.

Adjacent to the Fairbanks-Morse engine was the original machine shop servicing the observatory site. Most of the equipment is powered from a

line-shaft as shown in **Photo M**. A 120 VDC motor, shown in **Photo N**, drives the line-shaft. A rheostat, shown in **Photo O**, controls the motor’s speed. Although most of the original line driven equipment is still operational, several independent pieces have been installed.

Although our first tour stop was in the Astronomical Museum, **Photo P**, it is being discussed last because of its importance to the visit. A multitude of photos adorn the walls of the museum, with each describing many of the observed sights and phenomena from our nighttime sky. Much of the history of Mt. Wilson and the observatory is recorded and displayed within the museum, revealing many of the secrets of things that happen above our head. One of the things of concern to hams, of course, are flares occurring on the sun, and the way they affect our signal propagation.

Even though this tour was not strictly ham-radio-oriented, the scientific history and development represented was very enlightening to many of us. Because of the volume of information available, I suspect that a second or third trip to the mountain will be necessary in order to gain a proper perspective of the things that are going on around us but are normally out of our daily sight.



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After continuously being turned on for 14 days (336 hours), it was possible to read a newspaper using only the output from this amazing system. This item sold out at Dayton!

Say you saw it in 73!

CALENDAR EVENTS

Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the July issue, we should receive it by April 30. Provide a clear, concise summary of the essential details about your Calendar Event.

APR 13

ST. PAUL, MN The Robbinsdale ARC, Inc. (44 years old this year), will sponsor the 21st annual Midwinter Madness hobby electronics show at Ganglehoff Center on the Concordia University Campus in St. Paul MN, Saturday April 13th, 7:30 a.m. to 1 p.m. Concordia University is located off Interstate 94 near Hamline and Marshal. Super buys on computers, hardware, components, peripherals, and amateur radio equipment. Info, registration or tickets: 763-537-1722. Free parking. Same-day VE exams. Commercial Exhibitors. Large indoor swap meet. Admission is \$7 at the door. Children 12 and under admitted free. Advance discount tickets available at Amateur & Antique Radio Consignment Center, Pavek Museum, and Radio City. For more information visit [<http://www.visi.com/~k0ltc>], or E-mail [k0ltc@visi.com].

WEST ORANGE, NJ The IRAC Hamfest 2002 will be held by the Roseland Radio Club, IRAC, at West Orange High School, 600 Pleasant Valley Way, West Orange NJ, Saturday April 13th from 8 a.m. to 1 p.m. This event will feature amateur radio, computers, and things of interest to SWLers and electronics hobbyists. Plenty of free parking. Ground level access. This event will be held indoors rain or shine. Admission \$5 at the door (no advanced tickets). XYL/children under 12 free (with regular admission). Tables paid in advance are \$15 for the first and \$12 for each additional; or \$20 for the first and \$15 for each additional at the door. Add \$2 for the limited number of tables available with electric. You must RSVP by April 5th, after that, first come first served. Sellers ONLY admitted at 6:30 a.m. — no exceptions! Special parking lot for vendors. Talk-in on 146.415(+1.0) 85.4T, 447.875(-5.0) 156.7T, or 146.520 simplex, on the W2QR repeater system. Contact Harvey Muskowitz W2YWC, 973-994-0637. The Club Web page is at [www.qsl.net/k2gq].

APR 14

RALEIGH, NC The Raleigh ARS will present its 30th Hamfest and NC State ARRL Convention in the Jim Graham Bldg., NCS Fairgrounds, Sunday April 14th, 8 a.m. to 4 p.m. Wheelchair access. ARRL, MARS, ARES/NTS and QRP meetings are among the features of this event. All activities inside. Advance tickets are \$5 each, \$6 at the door.

Tables and booths are available. Free parking. RVs welcome. A Hospitality Party will be held Saturday night. VE exams W4VFJ, 919-556-8551. For pre-registration, general info and dealer inquiries, contact Jeff Wittich AC4ZO, 211 Dundalk Way, Cary NC 27511, tel. 919-362-4787.

STOUGHTON, WI The Madison Area Repeater Assn. will sponsor the Madison Swapfest Sunday, April 14th, at Mandt Community Center, Stoughton Junior Fair Grounds on South Fourth St. in Stoughton. Doors open at 8 a.m. Talk-in on 147.15. For further info see the Web site at [<http://www.qsl.net/mara>], or call 608-245-8890. Tickets are \$4 in advance and \$5 at the door. Free parking. Send payments to *Madison Area Repeater Assn., P.O. Box 8890, Madison WI 53708-8890*.

APR 20

MORGANTON, NC The 5th annual Catawba Valley Hamfest and Computer Fair will be held at the Burke County Fairgrounds, Hwy. 181 North, Saturday, April 20th, 8 a.m. to 4 p.m. The FCC's Riley Hollingsworth will speak. Vendor setup is Friday night and Saturday morning. Admission is \$4 in advance, \$5 at the gate. VE exams on site. For ticket info contact *Don Beam KK4NI*, tel. 828-652-3102, or E-mail [dbeam@wnclink.com]. For dealer info, contact *Larry Withrow AF4HX*, tel. 828-652-4195, E-mail [af4hx@worldnet.att.net]. Talk-in on 147.150(+)

APR 26, 27, 28

VISALIA, CA The International DX Convention, sponsored by the Southern California DX Club, will be held at the Holiday Inn Plaza, 9000 W. Airport Dr. Features include DX forums/programs, vendors, Saturday banquet and Sunday breakfast with major DXpedition speakers. Admission is \$60 in advance, \$65 at the door. For more info see [www.qsl.net/visalia2002], or contact *Don Bostrom N6IC*, 4447 Atoll Ave., Sherman Oaks CA 91432. Tel. 818-784-2590; E-mail [n6ic@arrl.net].

APR 27

SONOMA, CA The Valley of the Moon ARC, W6AJF, will hold its annual ARRL Hamfest, Saturday April 27th, from 8 a.m. to noon. The hamfest will be held at the Sonoma Valley Veteran's Memorial Bldg., 126 First Street

West, Sonoma CA, just one block north of the central Sonoma Plaza. Follow Highway 12 which passes through the center of town in front of the Plaza. For a map and printed directions to the hamfest, send a business size SASE to *VOMARC, 358 Patten St., Sonoma CA 95476*. Talk-in will be on 145.35(-600) PL 88.5. For more info call *Darrel WD6BOR* at 707-996-4494. Admission is free and hams are encouraged to bring the entire family. The event will include a walk-in VE exam session with registration starting at 9 a.m. Testing for all license elements begins at 10 a.m. There will be an electronics swap meet with both indoor and outdoor spaces available. Setup will start at 7 a.m. Spaces rent for \$10 each; free of charge for amateur radio organizations to use for informational tables and displays. The Club will serve a full breakfast from 8 a.m. to 10 a.m., including eggs, pancakes, sausage, juice and coffee or tea for \$5. Demonstrations include an operating QRP station, AMSAT, a display of home-brew equipment, and a beginner's RDF transmitter hunt. VOMARC members will be on hand to help visiting hams register with the FCC through the Universal Licensing System so they can renew licenses and upgrade. VOMARC will also be participating in the QRP to the Field contest, which will run during the hamfest. Guest operators are cordially invited to sit in and take a turn operating the Club station.

APR 28

ARTHUR, IL The Moultrie Amateur Radio Klub will hold their 40th annual Hamfest 8 a.m. to 12 p.m. on April 28th, at the Moultrie/Douglas County Fair Grounds on the south side of Arthur, just off of Illinois Route 133, behind the high school. Talk-in will be on 146.055/655 and 449.275/444.275. Admission \$5 per person over the age of 14 years. Tables are \$10 each, paid in advance. To reserve tables, or for info, write to *M.A.R.K., P.O. Box 91, Lovington IL 61937*, or call for info during the day at 217-543-2178, evenings at 217-873-5287.

CANFIELD, OH The Twenty Over Nine ARC Inc., of Youngstown OH, will host its 18th Annual Hamfest 8 a.m. to 2 p.m., Sunday April 28th at Mahoning County Career and Technical Center (formerly J.V.S.), 7300 N. Palmyra Rd., Canfield OH. Gate admission is \$5, children

Continued on page 57

MAROC-TUBSAT

On January 22nd, an E-mail went out to the AMSAT-BB remailer from Colin Hurst VK5HI, asking if anyone was aware of an amateur satellite with a beacon on 144.1 MHz. This began a series of fact-finding efforts by hams around the world to identify the mystery signals.

During the following 24 hours, many theories were posted until it became apparent that we had a new satellite operating within the Amateur Satellite Service frequency spectrum that was not a hamsat. MAROC-TUBSAT was on the air.

ZENIT-2 launches five satellites

On December 10, 2001, a Russian Zenit-2 rocket lofted five satellites into a 1,000-km (540 miles) orbit from the Baikonur

Cosmodrome in Kazakhstan. The primary payload was the 5,000-pound Meteor-3M meteorological observation (weather) satellite. Mounted on a ring around the base of Meteor were four much smaller satellites including Kompass, Reflector, BADR 2, and MAROC-TUBSAT. The orbit is circular and sun-synchronous, with an inclination to the equator of 99.7 degrees.

Kompass is a 175-pound geophysics satellite designed to help with earthquake predictions. Reflector is a curious satellite built

by NII KP in Russia under contract to the U. S. Air Force Research Lab at Kirtland Air Force Base in New Mexico. It is 4.5 feet long, 1.5 feet wide, weighs 13 pounds, and carries an array of laser retroreflectors. The satellite has four triangular fins on a square base with a deployable boom. Its purpose is to provide a resource for calibrating Air Force imaging systems and other optical sensors that are used to monitor "space junk."

The remaining two satellites, BADR 2 and MAROC-TUBSAT, were considered potential candidates for the signals heard on 144.1 MHz. The groups behind both satellites have a history of successful satellites that have used amateur-radio frequencies.

BADR 2 was built by SUPARCO (Space and Upper Atmosphere Research Commission) in Karachi, Pakistan, and SIL (Space Innovations Limited) of the United Kingdom. In Pakistan it is known as Badar-B. The satellite weighs 150 pounds and contains a number of experiments including magnetometers, a gravity-gradient boom, radiation detectors, a CCD (charge-coupled device) camera, and communications systems on VHF, UHF, and S-band. BADR 1 (Badar-1), the first satellite from SUPARCO, was launched several years ago. It had uplinks on 435.030 and 435.512 MHz. The downlinks were on 145.825 and 144.025 MHz. It was a 26-facet polyhedron shape weighing 115 pounds. Its signals on the two-meter band alarmed many hams since there was no apparent amateur-radio connection with the Endeavor. Fortunately it did not last long, only about a month.

A German-Moroccan satellite

MAROC-TUBSAT weighs in at 104 pounds and was built for Morocco's Royal Center for Remote Sensing by the German



Photo A. MAROC-TUBSAT, Reflector, BADR 2, and Kompass are arranged around the periphery of the ZENIT-2 adapter ring prior to the December 10, 2001, launch from Kazakhstan. (TUB photo)

Technical University of Berlin (TUB). The basic structure is derived from the TUBSAT-C spaceframe. The satellite is the first for Morocco and the CRDTS (Moroccan Royal Center of Space Teledetection). CRDTS is directed by Driss El-Haddani and has been active since 1989. The Technical University of Berlin, however, has had previous successful satellites, some using amateur-radio frequencies.

The primary mission of MAROC-TUBSAT is Earth remote sensing and vegetation detection from space. The camera resolution is 300 meters. Attitude control is provided by gyro assemblies in orthogonal axes coupled to a star sensor and sun sensor. Magnetic field sensors are also used.

Additional systems are incorporated for store-and-forward digital communications. The satellite has VHF, UHF, and S-band transmitters. MAROC-TUBSAT was identified by Ray Soifer W2RS as the source of the 144.1 MHz transmissions from space. The satellite was transmitting FSK (Frequency Shift Keying) CW as VVV DE CN/ZARKAA AL YAMAMA. CN is the ITU (International Telecommunications Union) prefix for Morocco.

Another frequency associated with MAROC-TUBSAT was noted at 436.075 MHz when the satellite was over Europe and Africa. Although the S-band transmitter is supposedly on 2208 MHz, no reports of reception were mentioned in January.

On Friday, January 11, 2002, Morocco's King Mohammed VI personally congratulated the Moroccan university professors responsible for design of the experiments on MAROC-TUBSAT. Morocco now joins Egypt and Saudi Arabia in a small group of Arab-Moslem nations with earth-orbiting satellites.

Less than two weeks later, Norbert Notthoff DF5DP, representing DARC, the German version of the American Radio Relay League, was in contact with some of these same professors to find out more about the incursion into the two-meter Amateur Satellite Service band. IARU (International Amateur Radio Union) Satellite Advisor Hans van de Groenendaal ZS6AKV was also establishing contacts to the Moroccan National Radio Society (ARRAM) to ask for more information about MAROC-TUBSAT.

Shortly after the excitement died down, the two-meter signals from MAROC-TUBSAT were off the air, and the other ham-band operations on 436.075 MHz and 13 cm were in question. Talks are continuing.

Continued on page 58

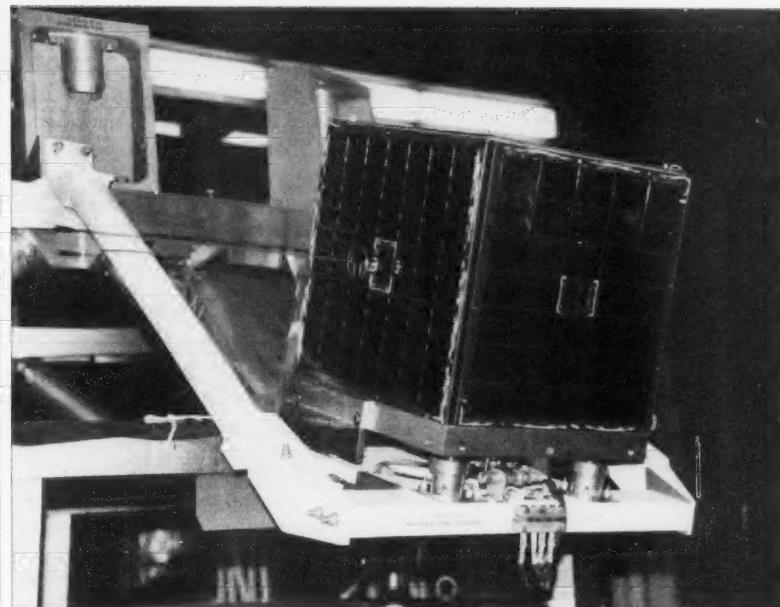


Photo B. MAROC-TUBSAT was built as a cooperative effort between groups in Morocco and Germany with communications gear on Amateur Satellite Service frequencies. (TUB photo)

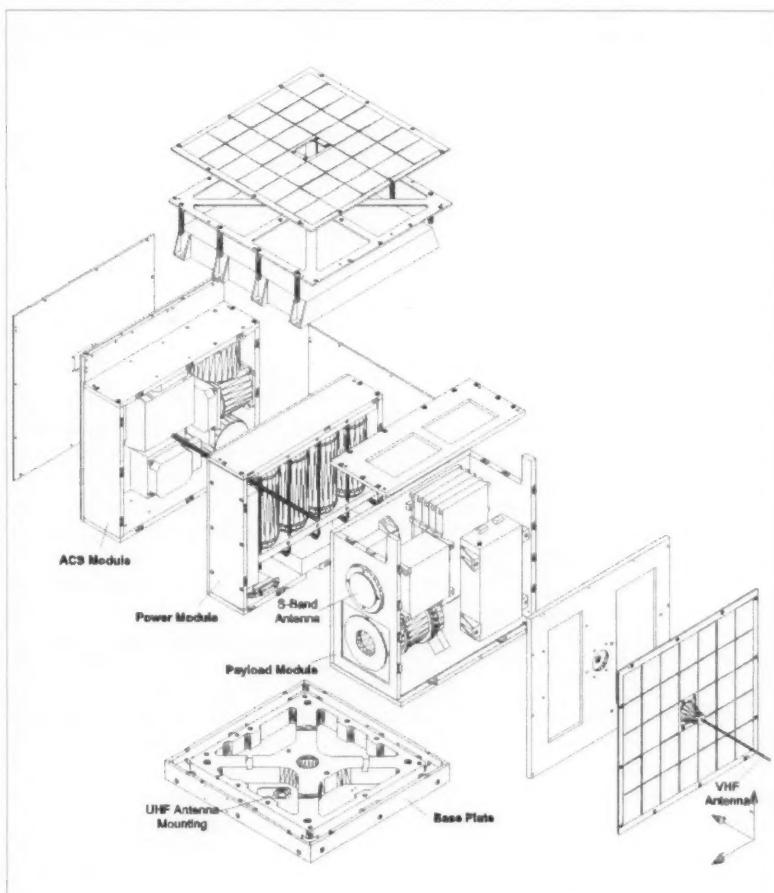


Fig. 1. Exploded drawing view of MAROC-TUBSAT from the Technical University of Berlin (TUB).

Freebie Antenna Aid

There are a lot of programs available to the ham these days, and most of us pay tribute primarily to those communications programs that have changed the face of ham radio. And this is rightly so, because that is the big news. But there are a few other valuable contributions that might fall unnoticed if we don't make some fuss over them.

The other day I was looking at one of the fine pieces of software from the library of free ham software. This was MMTTY. Ever since its release it has been a hit not only with the newcomer to RTTY — many old-timers have converted to its ease of use, excellent quality, cost (free), and dependability. Hard to beat.

The author, Makoto (Mako) Mori JE3HHT, has written another noteworthy communications program, MMSSTV, also freeware and of equally excellent quality. Many praises have been pronounced by users and columnists for both of the above programs.

However, Mako has two other ham programs to his credit that you very seldom hear about. One is his DSP audio filter, which works quite well with the soundcard, and another, MMANA, is a full-featured antenna design analyzer.

I know I tread on thin ice with some of you when I bring anything into this column that does not send and receive musical tunes via the soundcard while displaying message print on the monitor. But please bear with me a few minutes. Mako addresses a real issue here and he understands it well. You see, he was inspired to put forth this effort because of his own needs, and since it worked for him, he is sharing it with the rest of us.

As modern-day hams (especially in the USA) you are experiencing two factors that barely existed 20 years ago. We used to be pretty lucky in that we could erect some reasonable structure to support a decent antenna as long as we had an average city lot or larger piece of real estate surrounding our residence.

As most hams are painfully aware, that is the exception these days, unless you live a fair distance outside the city limits. My

case is a bit enviable in that I have had chunks of aluminum and wire sticking up for so long that it is somewhat tolerated in my neighborhood. That could change anytime, and then I could join the ranks of those with "stealth" antennas.

The other factor, which is a good thing, is the advent of the digital modes that is permitting exceedingly dependable communications at power levels which are typically ten percent of those we used to consider "average." I converse with hams frequently who are running 25 watts or less to attic antennas, and it is tough to maintain a consistent readable signal between the two factors of low power and the limited radiator. Don't get me wrong. Hams by their very nature are happy to communicate. It is simply a bonus when the adversity of antenna restrictions can be overcome with a few inexpensive adjustments.

To be perfectly honest, there is no common solution for this attic antenna dilemma, but what is needed is to do whatever is possible to make that crazy antenna into the best radiator possible. That is why I am spending a bit of time this month waving the flag for MMANA.

Before I go too far, I have to admit that I am as lazy as anyone. If I can put up a full-size antenna, either commercially built or copied from a handbook, that is what I do. Further, if I find I can load a chunk of wire to the point my transmitter is happy and I get consistent decent reports, I don't try to invent new wheels.

Additionally, these days there are some really neat commercial antenna analyzers on the market, and those who are in the know are using them. Sometimes I feel I suffered a slight misfortune from living in the days of the dip-meter (I still have one and break it out on occasion). These are

more difficult and time-consuming to use, and users tell me I have to be nuts not to at least put the dipper away and buy one of the new-fangled tells-all gadgets. Saves hours, they tell me. But there are more ways to skin the kitty. Some of us are old-fashioned.

Be all that as it may, the best success will be had if you can design and cut your limited-space antenna and feedline to the best possible dimensions. From there, whatever you do to adjust the SWR should become minimal and your success over the air will be much improved.

Bearing these facts in mind, a trip to the HamSoft MMTTY Web site to download the MMANA software can prove educational at the very least. Mako is right up front, as he explains that the program with all its instructions is not intended to be a course in design. He mentions a few pieces of recommended reading; unfortunately for most of us, those how-to references are in Japanese.

Do not let this little detail stop you. There are quite a few published works on antenna design readily available. I have several from the ARRL, and there are others on the shelves. Some of my reference material is just as old as the dip-meter I mentioned earlier. And, something to remember: If the principles were correct thirty years ago, they are not too far off these days. I will admit, however, that I still learn things about these strange radiating devices when I keep my eyes and ears open. It doesn't mean there are new principles; they may simply be old principles explained in a different light.

Getting started

Refer to The Chart for the MMTTY Web site. If you don't already have your copies

of MMTTY and MMSSTV, check them out. Then explore the DSP filter and, for sure, download the MMANA software. It isn't real big — less than a megabyte.

Install the program, then take a look at the folder/directory where the program is installed and bring up and print two files, Emman.txt and Eppen.txt. You can display these from the Help button, but I had no luck in printing them from there, so I imported them to my word processor and printing was a snap from there. They are 15 to 20 pages each. I prefer hard copy for files that length.

Unless you are already an antenna engineer (I am not), these files will not be fully understandable. You do need this information. Then you will discover several things as you read the text files. The first is at the very end of one of the files: The author of the program lives in an apartment in Japan and is in about the same antenna predicament as many of you. In fact, he appears to have about as much space for antennas as someone living in a hotel.

Thus, one of the driving factors behind building an antenna analyzer program was optimizing his own meager "antenna farm." As I was reading through the text files, I found references to models Mako had stored for different types of antennas. He did a lot of experimenting, and the results will be of interest.

The file I brought up from the subdirectory included in the program is for a Windom antenna to load on 80, 40, 20, and 10 meters. The view in Fig. 1 is only one of four panels available for that antenna model. You will find other panes available as you click on the tabs above the display. This allows you to alter and recalculate the properties of your antenna to see what is most likely to work.

This Windom antenna appears to be an attempt at a radiator to fit in a limited space and not necessarily the optimum design to be installed down on the farm. His instructions for the use of the program give a lot of glimpses into the best ways to use the program and, in the process, a few tips about how some parts of the antenna work.

After you experiment with this for a while, you will hopefully get "hooked" and find it necessary to break out those antenna design books you have had lying around and put something together that really works regardless of what kind of space you have to work within. Personally, I have several projects I have been putting off, mostly because of the time-consuming what-if math necessary, and that is all made much easier with a program such as this one. And you will like the price.

Back to operating systems

You may not keep as many ham applications in your computer as I have here. The latest count is about 20 ham applications plus the various word processing and graphics necessities used to compile these columns. Each of these programs, especially the ham software, deserves credit for making computers useful.

All of these programs worked well in versions of Windows prior to the Millennium Edition (Me) that came with this new computer. I have just a few more programs to try, and the next order of business will be to save these files to a CD, format the hard drive, and install Win98se.

I talked to the service folks at the computer manufacturer and they warn me that I will void the warranty on the machine in so doing. That's really tough; the only problems with this computer have been caused by the Me operating system, and the manufacturer of the equipment simply throws up its hands when asked for help. Been on my own all the way anyway.

By the way, I receive a lot of mail concerning my ranting about Me. Most folks agree, and some offer suggestions — which

I appreciate. I occasionally receive messages where my use of the language must fail and it appears I am saying certain software has failed me under this operating system due to a defect in the programming.

I never want to leave that impression. All the software I mention in this column works and has been written by hams for the express purpose of advancing the technology. It is all good software. Please do not read negative thoughts into the message that would indicate disapproval of the programs reviewed. It is only the operating system (Me) with which I am at odds.

One other note on the operating system dilemma. I heard a rumor the other day that there are two new systems on the drawing board to replace the XP already. Hard to understand. What are the programmers to do? Just imagine all the free alterations necessary to keep our ham computers playing their magic tunes. When Microsoft is in charge of the music, your guess is as good as mine.

Linux

Speaking of operating systems, I mentioned last month that I intended to install Linux in the old slow machine that this current

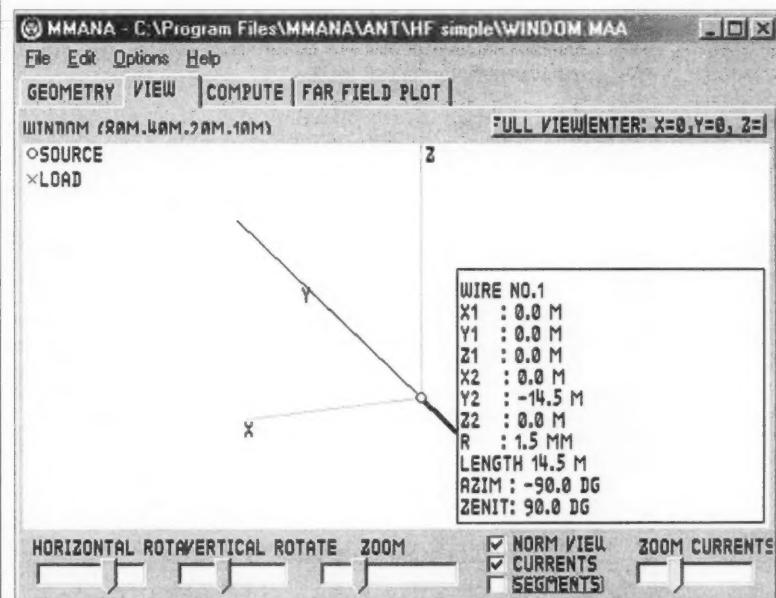
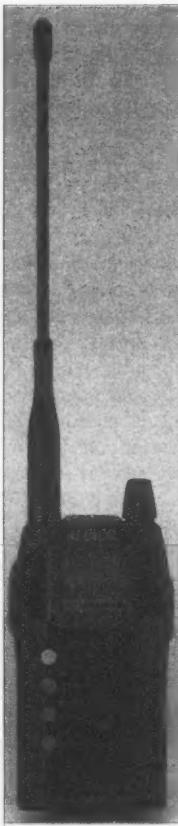


Fig. 1. Screenshot — Here is just one of the panels available in the MMANA free antenna analyzer available from the author of the MMTTY and MMSSTV programs. With today's limitations and restrictions on ham antenna location, you need all the help you can get to radiate a decent signal from the many stealth locations, especially attics, that hams are forced to use. This program can help you make the calculations necessary to turn these tough conditions around in your favor. The program comes with a lot of good information concerning operation of the software. You will still need some good basic fundamentals in antenna design principles. The author of this program developed it because he faces the same restricted space problems as many US hams.

NEW PRODUCTS



Alinco's DJ-S40T Pocket HT "Second Generation" Pocket-Size UHF Transceiver

Alinco has introduced the DJ-S40T UHF HT, a pager-size transceiver that replaces the very popular Alinco DJ-S41. The new model has several improvements over the original and can transmit with up to 1-watt output with the optional Ni-MH battery or external DC power. Announcement of the new unit was made by Craig Cota of ATOC Amateur Distributing, which distributes Alinco products to dealers in the USA and Canada.

The new DJ-S40T has a "normal" output of 500 mW, 100 memories, a call channel, several scan modes, and more. It covers the entire U.S. UHF amateur radio allocation of 420-450 MHz, with receiving capabilities beyond the allocated transmission range.

Unique features include a newly designed case that conceals the speaker but provides loud, clear audio. The antenna is now a standard SMA fitting. There are 38 CTCSS encode and decode settings (decode included as a standard feature) and four tone bursts that make the unit usable for repeater operations in many parts of the world.

The large illuminated display is easy to read and provides information to the user about a number of useful features. Alinco has added its experimental "mosquito repelling feature" to the unit along with a theft alarm function and the ability to clone units by cable. There's also an external power port.

Many Alinco accessories, such as a wide variety of speaker mics and power cables, are cross-compatible with the DJ-S40T.

In addition to normal simplex and repeater operations, a very popular application of the tiny transceiver could be its use through cross-band transceivers, essentially using the DJ-S40 as a "remote mic" through a base or mobile dual-band transceiver.

The MSRP for the DJ-S40 is \$109.50, but dealers often set "street prices" below the suggested retail.

"The DJ-S40T demonstrates Alinco's continuing leadership in the development of small-sized, high performance, low-cost transceivers," says Mr. Cota. "The DJ-S41 proved there is a market for pocket transceivers and that most areas served by repeater systems do not require high power in order to achieve reliable communications. The DJ-S40 is an exciting 'next step' in the evolution of small-size, full-featured radios that are fun and affordable."

NEVER SAY DIE

continued from page 7

Ollie North was being interrogated by a senate committee. He was asked by a senator why he spent \$60,000 on a security system for his house. Ollie said it was to protect him and his family from a terrorist.

"Terrorist? What terrorist could possibly scare you that much?"

"His name is Osama bin Laden, sir," Ollie replied.

The senator tried to repeat the name, but couldn't pronounce it, to snickers from the audience.

"Why are you so afraid of this man?" the senator asked.

"Because, sir, he is the most evil person alive that I know of," Ollie answered.

"And what do you recommend we do with him?" asked the senator.

"Well, sir, if it were up to me, I would recommend that an assassin team be formed to eliminate him and his men from the face of the earth."

The senator disagreed with this approach.

The senator was, of course, Al Gore.

Why Hams Are Not Building

I hear complaints on the air and in letters that hams don't build like they used to. News flash: Hams have never built "like they used to." Hams have, in general, never bothered to build anything they could buy commercially. Early hams built their own receivers — up until the day after the

first commercial ham receiver was announced. When I was a kid in Brooklyn I roller skated around town, visiting almost every active ham and I found only one out of over a hundred who'd built his own receiver. Nut case. Sure, we built our own rigs, but we had to — there weren't any commercially built transmitters available. And when the contraptions we built didn't work we took 'em over to Cy W2IXY so he could find out where we'd gone wrong. His only piece of test equipment was a neon bulb. Hey, I haven't seen any of those 110V neon bulbs in years.

In those days I could go to Cortlandt Street and shop for parts, or to Canal Street, over on Sixth Avenue, to Radio, Wire, Television (later named

Lafayette Radio). Wow, did they have parts! Radio stores with acres of parts tables are long gone.

Heath and Eico came along with kits, which made building a snap. We didn't even have to make our own holes for tubes. Now they're gone. We still have Ramsey and MFJ doing a good business in kits. And it is fun to build your own stuff and to tell visitors, "I built it myself."

But the idea of building some of today's complicated rigs is discouraging. I suspect that one of the reasons Heath folded was that equipment was just getting too complex. I remember George Morrow, who came out with a bunch of state-of-the-art computer

Continued on page 59

ADVERTISERS' INDEX

R.S.#	page	R.S.#	page	R.S.#	page	R.S.#	page
• A & A Engineering	23	• Communications		• M ²	58	• Radio Book Shop	21
• Alinco	CV2	Electronics, Inc.	5	• Maggiore		• Radio Book Shop	42
• Alinco	CV3	10 Communications		Electronics Lab	59	• Radio Book Shop	54
• All Electronics Corp.	11	Specialists, Inc.	17	• Michigan Radio	49	• Radio Book Shop	57
• Amateur Accessories	59	• D & L Antenna		160 Micro Computer		• Radio Book Shop	59
16 Astron Corporation	2	Supply Co.	42	Concepts	13	• Radio Book Shop	63
• ATOC Amateur		• Dayton Hamvention	15	• Midland Technologies	21	34 Ramsey Electronics	3
Distributing LLC	CV2	13 Doppler Systems	18	193 Morse Tutor Gold	58	• RLS	7
• ATOC Amateur		• Fair Radio Sales	13	• Omega Sales	18	254 Ross Distributing	58
Distributing LLC	CV3	193 GGTE	58	• Omega Sales	21	• Scrambling News	28
42 Bilal Company	23	• Ham Ambassadors	33	• Omega Sales	28	• SGC	7
168 Buckmaster Publishing	23	• Ham Mall	17	• Radio Book Shop	7	• Universal	
56 Buckmaster Publishing	28	• Hamtronics, Inc.	9	• Radio Book Shop	12	Amateur Radio	17
• C & J Radio	59	• Houston Amateur Radio	12	• Radio Book Shop	13	• W5YI Group	12
99 Communication Concepts	21	42 Isotron	23	• Radio Book Shop	18	• Yaesu	CV4

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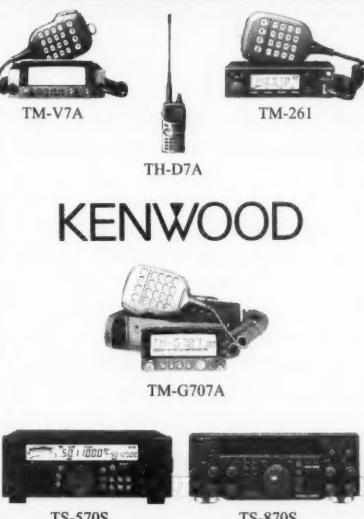
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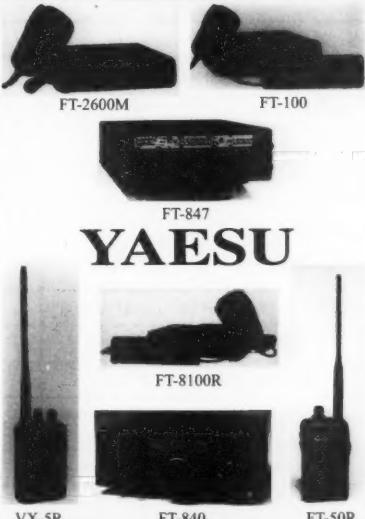
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whiz-bang system replaced. Done that. And that is a continuing learning process. Several Linux users (hams, remotely located) warned I should get a local guru to stand over my shoulder to get the setup up and running.

Local Linux gurus are not readily available, at least around this corner of the shire. If they are here, they are burrowed into their hobbit holes so deeply that they will not see daylight until the week after I have this project conquered. And this is one project that looks as if I can work on it for a long time and never really feel proficient enough to come to someone else's aid.

The reason, I am finding, is there are so many versions of Linux out there. What

cures I have found listed and published by other new users have not applied here because of those differences. That is one more reason there is so little help for the newbie: The would-be helpers don't wish to embarrass themselves in new territory.

So, here is where it stands at this stage of the game. I installed the Red Hat version 7.2, which is said to be one of the easier installations. To obtain direction on this installation, I went down to the local book supermarket and culled through many feet of bookshelf space lined with books on Linux. I purchased the thickest one I found and digested several chapters on installation before proceeding.

The big, thick (over 2 inches) book did

pretty well. I am finding the advantage is that the book came with three CDs. Two of them have the installation files and the third one has documentation that if I ever printed it, would likely fill one of my bookshelves and run over onto the floor. As a little aside, I have noticed that Microsoft's documentation for Windows 2000 Professional (over \$200 worth of books) is quite lengthy also. These are both systems primarily engineered to operate networks. The similarity ends there.

Linux is a take-off on Unix and is a whale of a system for networking. That isn't what I am after of course. The interest in this shack lies in the fact there are about a half dozen ham programs written for Linux. And they are soundcard programs similar to the ones we are seeing written for Windows.

The real interest I have is in seeing what the operating system can do in my shack. I thought this system would run well on an old slow computer such as the 120 MHz CPU with 32 megs of RAM that it is residing in at this time. Well, that situation is answered with a yes and a no. Yes, it will run, but if I implement the Windows-style desktop, it runs like a snail.

So I experimented. By the way, on the initial installation the system started up okay but ran like a snail with a broken leg. After a bit of research, I decided that the swap file I had allotted was a wee mite small and had to reconfigure. After that, I found I could get reasonable performance from the desktop until I demanded too much from it, such as running the Netscape program that came with it at the same time.

On with the experimenting. I found I could escape the desktop, bring up one of the available shells, and run Netscape on its own and the speed was acceptable. Further probing showed that the dialer, which I could only seem to activate under the desktop, would stay awake after exiting the desktop. Amazing what you can do with a little tinkering.

These conditions made it possible to dial up my ISP and download three Linux PSK programs from the G3VFP site listed in The Chart. I felt like I had conquered this thing by then. I hate to admit the number of hours it took to get to that point, but it is possible for someone, regardless of skill level, to exercise persistence and get into the Linux and make it work.

Now I have only to get the soundcard to cooperate, learn the decompression and installation techniques, and run a few cables, and we may see this thing on the air. Just a

Source for:	Web address (URL):
Mix W Soundcard program for PSK31, RTTY, new modes, MMTTY, FSK31, more	http://lav.kiev.ua/~nick/my_ham_soft.htm http://users.nais.com/~jaffejm/mixwpage.htm
MMTTY RTTY soundcard freeware	http://www.geocities.com/mmtty_rtty/
TrueRTTY — Sound card RTTY w/ PSK31	www.dxsoft.com/mtrtty.htm
Pasokon SSTV programs & hardware	www.ultranet.com/~sstv/lite.html
PSK31 — Free — and much PSK info	http://aintel.bi.ehu.es/psk31.html
Interface for digital - rigs to computers	www.westmountainradio.com/RIGblaster.htm
Soundcard interface info — includes Alinco	www.packetradio.com/psk31.htm
Interface info for DIY digital hams	www.qsl.net/wm2u/interface.html
WinWarbler info and free download	www.qsl.net/winwarbler/
MFSK — related tech info — how it works	www.qsl.net/zl1bpu/
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Digipan — PSK31 — easy to use — new version 1.6	http://members.home.com/hteller/digipan/
TAPR — Lots of info	www.tapr.org
TNC to radio wiring help	http://freeweb.pdq.net/medcaff/tx/
ChromaPIX and ChromaSound DSP software	www.siliconpixels.com
Timewave DSP & AEA (prev.) products	www.timewave.com
Auto tuner and other kits	www.ldelectronics.com
XPWare — TNC software with sample DL	www.goodnet.com/~gjohnson/
RCKRtty Windows program with free DL	http://www.rckrtty.de/
HF serial modem plans & RTTY & Pactor	http://home.att.net/~k7szl/
SV2AGW free Win95 programs	www.raag.org/index1.htm
Source for BayPac BP-2M & APRS	www.tigertronics.com/
Int'l Visual Communication Assn. — nonprofit org. dedicated to SSTV	www.mindspring.com/~sstv/
Heilschreiber & MT63 & MFSK16 (Stream)	http://iz8bly.sysonline.it
HamScope — multimode w/ MFSK16	http://users.mesatop.com/~ghansen/
YPLog shareware log — rig control — free demo	www.nucleus.com/~field/

Table 1. The Chart.

ON THE GO

Mobile, Portable and Emergency Operation

Steve Nowak KE8YN/O
16717 Hickory St.
Omaha NE 68130-1529
[ke8yn@cox.net]

A Wake-up Call

The terrorists who attacked the United States last September succeeded in having an impact. We see this every time we travel through an airport. Did they also deal a crippling blow to amateur radio?

You may have read in the newspaper or in one of the ham magazines that there is a proposal to establish an emergency communications service somewhat along the lines of the National Guard. The idea is that this group could be called to duty to provide communications in an emergency. Proponents of this plan have pointed out that normal communications may fail during an emergency, so there is the need for alternative communications. America needs to have a reliable source to which it can turn to provide this service quickly when needed. One idea is to establish this technology-based service, equip it with appropriate radios, train the communicators and have them ready, willing, and able to respond if and when needed.

I don't know about you, but reading about this new service seemed like reading an ad in the help wanted section, and for my own job. Isn't this what amateur radio is supposed to do? Of course it is! If we have a group that already provides this service, why are we talking about establishing a similar service? If we have a group of trained communicators who not only provide a service but also bring their own equipment at no cost, why do we need to re-invent the wheel with this new service?

Because the right people don't know we exist. That's why! To many people, ham radio is just a hobby. It is something like CB. It's something that a bunch of old men do. It messes up televisions and lowers property values with big ugly antennas. Generally people don't see amateur radio as a valuable service that is there to provide communications in an emergency. They only see a quirky hobby.

There are two main reasons that this occurs. First, one of the effects of peaceful times is that there is a comfort level, and that comfort level is partially due to ignorance.

Ignorance is not stupidity — it merely means that people are not aware of the facts. When you feel secure and your telephone works and your cell phone is reliable, it is natural to not even think that backup systems may be required to be used someday under some conditions, somehow. How often do you think about your smoke detector if it is not sounding an alarm or requiring a battery change? Probably never. Amateur radio is in the same boat.

Second, we hams have become just as complacent as everyone else. We may get some publicity from time to time, but much of that is relatively innocuous. Do you read every news story in your daily newspaper? Of course not. So why should we believe that everyone would devour the article on page 9 about ham radio? While many of these are quite good, they tend not to grab other people's attention. If they highlight ham radio support for a disaster, the very people we need to see the article are often too busy worrying about the disaster itself rather than our contribution to it. Besides, while the general public is important, it is *more* important to get our message in front of the real decision-makers.

If it is believed that amateur radio cannot or will not be a primary provider of emergency communications, one of the primary reasons for amateur radio's very existence is eliminated. The frequencies that we have been loaned may be necessary for other purposes, and amateur radio could cease to exist. Trying to operate a ham radio would be viewed the same as trying to drive a horse and buggy down the interstate: out-of-date strange behavior that might no longer be legal.

Get involved! Really involved! Do you have an Amateur Radio Emergency Services (ARES) or Radio Amateur Civil Emergency Services (RACES) identification card? Do

you have a grab-and-go kit of essential materials you'd need in an emergency? Do you regularly check into the local emergency net? If not, it's time to start.

We need to demonstrate to the people who matter that we can AND WE WILL be there, ready to provide communications services when needed and for as long as needed. When the National Guard was tasked with ensuring additional security at the nation's airports, they accepted the mission. They will carry out that mission until relieved of it. That is the level of support that our nation now needs.

Times have changed. No longer are we talking about three days of support after a storm strikes. We need to demonstrate that we can and will provide emergency communications when called upon until that need no longer exists. It may be time to more closely coordinate our efforts with civil defense and public service agencies. It may also mean we have to define methods for providing extended operations if called upon to do so. Does your ARES, RACES, or club group have a plan to do so? If not, I propose that every amateur radio group get a commitment from every member to provide at least four hours' support per week if necessary. Develop a schedule to show how the hams in your city could provide around-the-clock coverage on an ongoing basis if called upon to serve. I think that most of us are convinced that we have the equipment and the ability. What we need to demonstrate is that we will have the endurance as well.

The other thing that we need to do is to let the right people know what we are capable of and committed to. The human-interest story on ham radio in the local newspaper is nice and ego-gratifying but does

Continued on page 59

HOMING IN

Radio Direction Finding

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USA's Foxhunters Take On the World

Every year, more and more hams discover the fun of hidden transmitter hunting, either in cars (called T-hunting and bunny hunting) or on foot (called foxtailing, radio-orienteering and ARDF). For those who prefer searching for transmitters while on the run, 2002 brings the opportunity to compete against fellow hams both at home and abroad.

Is there any doubt that on-foot transmitter hunting under international rules is the fastest growing form of ham radio contesting? It combines adventure, intrigue and exercise with an activity that's suitable for hams and nonhams of almost any age. The best radio-orienteers are physically fit, mentally alert, and technically adept. If you're looking for a way to hook your children, grandchildren, nieces, and nephews on amateur radio, this activity may be your answer.



Photo A. Even if you're not ready for the championships, you can have radio-orienteering fun in a park near you. Why not volunteer to put on a foxhunt for your radio club this spring? In this photo, Art Jury KF7GD takes his young "navigator" along on a two-meter hunt in southern California. (Photos by Joe Moell)

This spring, why not hold some easy in-the-park transmitter hunts to get local hams and their offspring going (**Photo A**). Then you can progress to international-rules hunts on both eighty and two meters. For ideas on equipment and rules for simple hunts like this, see the "Homing In" Web site and previous "Homing In" columns.^{1,2}

ARDF in the Appalachians

For over 20 years, hams in Europe have staged national and multinational events to crown the best on-foot foxhunters. Last year, for the first time, USA had its own national championships, hosted by the Albuquerque Amateur Radio Club.^{3,4} Competitors came from ten states, including groups from several metropolitan areas such as Los Angeles, Denver, Atlanta, Cincinnati, and Raleigh. Afterwards, I had no trouble finding individuals and clubs from these locations who were eager to host the next one. After much discussion, the nod was given to the Georgia Orienteering Club (GAOC).

Because of its importance in the selection process for USA's team to the ARDF World Championships (more on that later), USA's national championships must take place in the spring this year. GAOC proposed a simple one-weekend competition schedule that would minimize expenses and away-from-work time for ARDFers who wish to attend both of 2002's major radio-orienteering events.

The Second USA ARDF Championships will be held on April 19–21, 2002, at F. D. Roosevelt State Park near Pine Mountain, Georgia. The competition gets under way on Friday afternoon with a practice event, followed on Saturday by the main two-meter hunt, and on Sunday by the 80-meter hunt. In addition to the hunts, there will be a

cookout on Friday evening, a spaghetti dinner on Saturday night, and an award ceremony following the 80-meter hunt.

Competitors are divided into five categories for males and four categories for females, in accordance with newly approved ARDF rules of the International Amateur Radio Union (IARU) (**Photo B**). There will be awards for the first-, second-, and third-place finishers in each category. Foreign visitors are welcome and encouraged to



Photo B. Think you're too old for ARDF? There's a special category for men over 60, and there will be lots of competitors in that category at the USA and World Championships. This is Bob Cooley KF6VSE, a medal-winner in classic orienteering who now takes to the trails with radio gear. The set he's holding is for the 80-meter band.

come and compete. Awards will be presented in two divisions, Overall and USA-Only.

Pine Mountain is approximately 90 minutes southwest of Atlanta. There are many local motels and bed-and-breakfast inns nearby, because the town is adjacent to Callaway Gardens, a 14,000-acre resort. If you're pinching pennies or if you just like to rough it, there are cabins in the park and campgrounds with RV hookups.

Laurie Searle KG4FDM of GAOC is the Meet Director. Her husband Sam Smith N4MAP (**Photo C**) is the ARDF course-setter. Both have years of experience hosting classic (non-radio) orienteering meets. Sam won a silver medal at the First USA ARDF Championships in Albuquerque.

Whether you're an expert or you've never finished a formal radio-orienteering course before, the USA's ARDF Championships are open to you. The deadline for registering is April 6. If that's already passed by the time you read this, it may still be possible to attend, so contact the organizers right away.

The easiest way to register for the Pine Mountain events is via the GAOC Web site, where you will find the event flyer, rules, and information about an E-mail notification list. Registration forms are available for download. You can get there by link from the "Homing In" site. If you're not on the Internet, write to GAOC's Registrar, Robin Shannonhouse, 4738 City View Drive, Forest Park GA 30297.

Be sure to allow an extra day before or after the Championships for a visit to Callaway Gardens, which is famous for its nature trails, flower gardens, butterfly center, birds of prey show, and much more. You can play golf, ride a bike, go fly-fishing, or shoot clay targets. If the ARDF action has worn you out, just sit and enjoy the flowers and the music from the Memorial Chapel.

Tracking in the Tatras

Later this year, the USA takes on the world once again as Team USA travels to Slovakia for the Eleventh World Championships (WCs) of ARDF. This will be the third time that Americans have participated in the WCs. In September 1998, a group of five stateside hams went to Nyiregyhaza, Hungary, to compete and observe.⁵ Then, in October 2000, a dozen from seven states made the journey to Nanjing, China, as the WCs took place in Asia for the first time.⁶

The Slovak Amateur Radio Association (SARA) is hosting the championships. The site is Tatranske Matliare in the High Tatras of the Slovak Republic, at about 3,000 feet

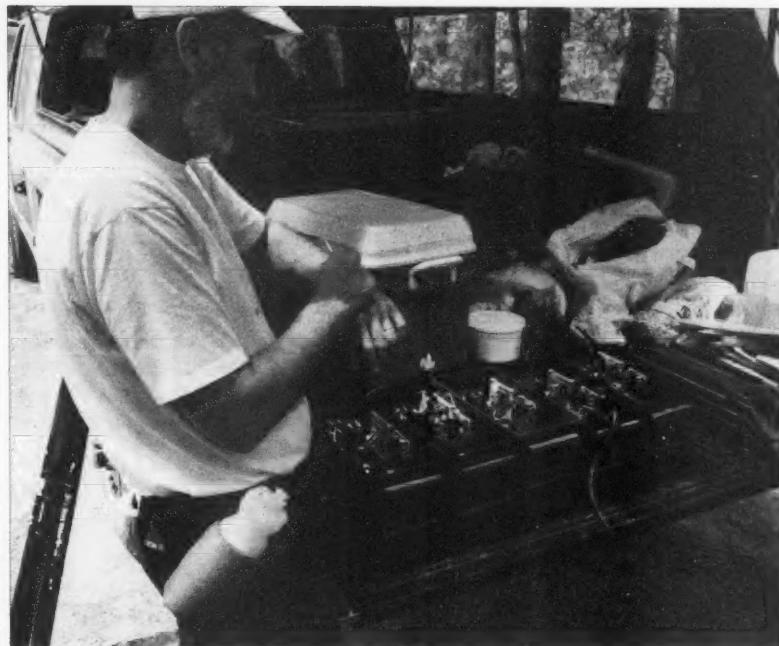


Photo C. Sam Smith N4MAP of Georgia Orienteering Club sets the timers on his 80-meter fox transmitters at a practice session before the Championships in New Mexico last year. He will set courses for the Second USA ARDF Championships in Pine Mountain.

in elevation. It's about 240 miles east of Prague and 125 miles north of Budapest. The terrain is mostly forested.

As most Americans celebrate Labor Day on September 2, Team USA members will touch down in Europe, travel to either Poprad or Kosice in Slovakia by air or rail, and then be transported by the organizers to the host town. They can stay at one of two fine hotels (Hutnik and Metalurg) that are being completely taken over for this event. If they choose the hotel package, the registration fee for the entire championships, including events, lodging and meals, is 300 US dollars per person.

Alternately, participants can get a half-price package that does not include room and board. They will camp and cook in a nearby park, providing their own shelter and food. In either case, they have access to the facilities that include a gymnasium, swimming pool, fitness center, and game room.

On Tuesday, September 3rd, the Slovaks will host ARDF training events on both bands, followed by a gala Opening Ceremony. These ceremonies traditionally include a parade of the competitors, entertainment, and welcome by local dignitaries.

Wednesday starts early as competitors board buses to be taken to an undisclosed location for the big transmitter hunt on two meters. Thursday is a day of rest, with an

optional cultural program. Friday is the 80-meter hunt in a different venue, followed by the Closing Ceremony and a mini-hamfest. Everyone heads for home on Saturday morning.

Competitors are divided into the same age/gender categories as in Pine Mountain. Each country may have a maximum of three persons per category on its team.

If the 2002 ARDF World Championships are typical, there will be a total of about 250 competitors from 25 European and Asian nations. The "big guns" of the contest will be all the eastern European and former Soviet Union countries, plus China and Germany. We're still "little pistols," but that just means that we learn lots more when we attend, and we learn from the best.

Team USA members are responsible for their own transportation expenses to and from Slovakia. Entry fees are due in full to the organizers by July 15, 2002. ARRL will handle the wire transfer of funds, but it is not known yet if there will be any financial support from ARRL.

As ARRL's ARDF Coordinator, I have submitted the USA's Letter of Intent to Participate to the Slovakian organizers in accordance with IARU procedures. Twelve stateside foxhunters with current ages from 11 to 60 have already expressed strong

Continued on page 54

HOMING IN

continued from page 53

interest in attending. But it's not too late to put in your name for Team USA consideration.

Our categories for males between 40 and 59 years of age (as of 12/31/02) already have three or more signups, but more are welcome. Team USA selection in "overbooked" categories will be based on recent performances and standings in formal events such as last year's USA ARDF Championships in Albuquerque and this year's USA ARDF Championships near Atlanta. The divisions for males under 40 and for all females still have openings as of this writing, so it may be possible for inexperienced radio-orientees in these categories to join the team (**Photo D**). It is also possible to attend as a non-competing visitor, but our visitors must be listed as such on the national team roster and fees paid via ARRL.

If you are interested in traveling to the 2002 ARDF World Championships as a member of Team USA or as a USA visitor, please contact me immediately. If you have not been on Team USA before, include your full name and mailing address, callsign,

home phone number, and date of birth. You must be an American citizen or have resident status in this country. Also, visit the "Homing In" Web site, where you can read the latest news of Team USA formation plus stories and photos of previous Team USA trips, to give you an idea of what to expect.

If you wish to participate as a citizen of another North or South American country, contact IARU Region 2 ARDF Coordinator Dale Hunt WB6BYU by E-mail to [wb6byu@arrl.net] or by USPS to P.O. Box 108, Carlton OR 97111. Canadians should also contact RAC ARDF Coordinator Perry Creighton VA7PC by E-mailing [va7pc@rac.ca] or writing to 3018 Spring Bay Road, Victoria BC V8N 1Z3.

The World Championships of Amateur Radio Direction Finding (ARDF) take place only in even-numbered years, so you won't have another opportunity to compete in the WCs until 2004. I'm waiting to hear from you.

Other opportunities

Traveling to overseas events is a great way to learn ARDF techniques from the best and

most experienced practitioners. If you can't go to Slovakia in September but want an overseas radio-orienting experience, look for announcements of other high-profile events where visitors are welcome. For instance, about 150 competitors from all over Europe are expected for the Ukrainian International ARDF Championships, 26 April through 1 May in Kiev, the capital city.

This year's national ARDF championships of Belgium are 8-9 June in Arlon, which is located in the southeast part of the country, close to the borders of France and Luxembourg. For boys and girls born in 1987 or later, the Third European Youth Amateur Radio Direction Finding Championships are 10-14 June in Nessebar, Bulgaria, on the Black Sea coast. Links to Web sites for each of these meets are at the "Homing In" Web site.

Thanks to all who are sending me stories and photos of your local RDF contesting activities, both in vehicles and on foot. Keep them coming by E-mail or postal mail to the addresses at the beginning of this article.

Footnotes

1. Moell, Joe, "Homing In: Radio Foxes Don't Howl," *73 Magazine*, March 1998.

2. Moell, Joe, "Homing In: ARDF is Off and Running," *73 Magazine*, June 1998.

3. Moell, Joe, "Homing In: ARDF Championships Part 1 — Triumph in the Land of Enchantment," *73 Magazine*, December 2001.

4. Moell, Joe, "Homing In: ARDF Championships Part 2 — The World Comes to Duke City," *73 Magazine*, January 2002.

5. Moell, Joe, "Homing In: A Banner Year — More to Come," *73 Magazine*, January 1999.

6. Moell, Joe, "Homing In: A New Millennium for Foxhunting," *73 Magazine*, January 2001.

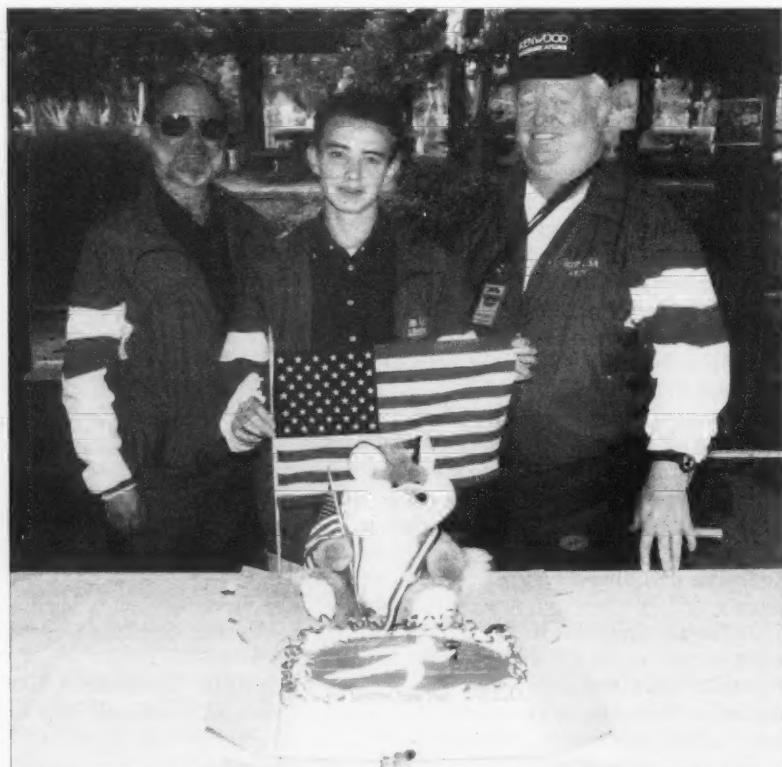


Photo D. Jay Thompson W6JAY was 15 years old when he traveled with his dad Richard WA6NOL (right) to the 2000 ARDF World Championships in China. Afterwards, they and Team USA member Marvin Johnston KE6HTS (left) were honored at this park hunt near their home.

If you're a No-Code Tech, and you're having fun operating, tell us about it! Other No-Code Techs will enjoy reading about your adventures in ham radio—and we'll pay you for your articles. Yes, lots of nice clear photos, please. Call Joyce Sawtelle at 800-274-7373 to get a copy of "How to Write for 73 Magazine."

Does Your Junk Box Runneth Over?

continued from page 21

does work, but the amount of time consumed usually takes the "desire" out of constructing a project. Of course, you may be the type so easily frustrated by the confused parts storage that you'll run down to the local "candy store" to obtain the desired part, knowing full well that a supply of them exists in the junk box.

Another technique for storing things is shown in **Photo B**, where everything

is piled in the open so that you can find the "thing" by scanning the shelf. Yes, the amount of time required to locate the needed item is reduced, but the "pile" of stuff must still be handled to retrieve the desired piece. Stacking large pieces on the shelf works reasonably well for some items, but how do you handle small electronic parts? Over the years, the size of an electronic part has shrunk from "huge" to micro-miniature. The smaller the part, the better your organization must be to keep from losing the item. Do you store your junk box parts in coffee

cans or shoe boxes? Maybe you use old paint cans, trash bags, or cardboard boxes. Whichever method is used, there has to be a technique available for retrieval. One of my friends uses glass canning jars for storing small parts. Perhaps you recall the "Mason jar" that had a wide mouth and a screw-on lid. These jars make an excellent storage medium for items that can be identified visually by scanning the jar's contents. In most cases, the jar lids are secured to the underside of a shelf so that the jar can be easily viewed and retrieved should it contain the desired part. Jars are well suited for the organization and storage of nuts, bolts, and other small hardware items.

A technique that I started using when I was a youngster was to place parts in cigar boxes as shown in **Photo C**. Yes, when I was a kid, cigar boxes were readily available for the asking — and I accumulated a lot of them. Believe it or not, some of my boxes are so old that they

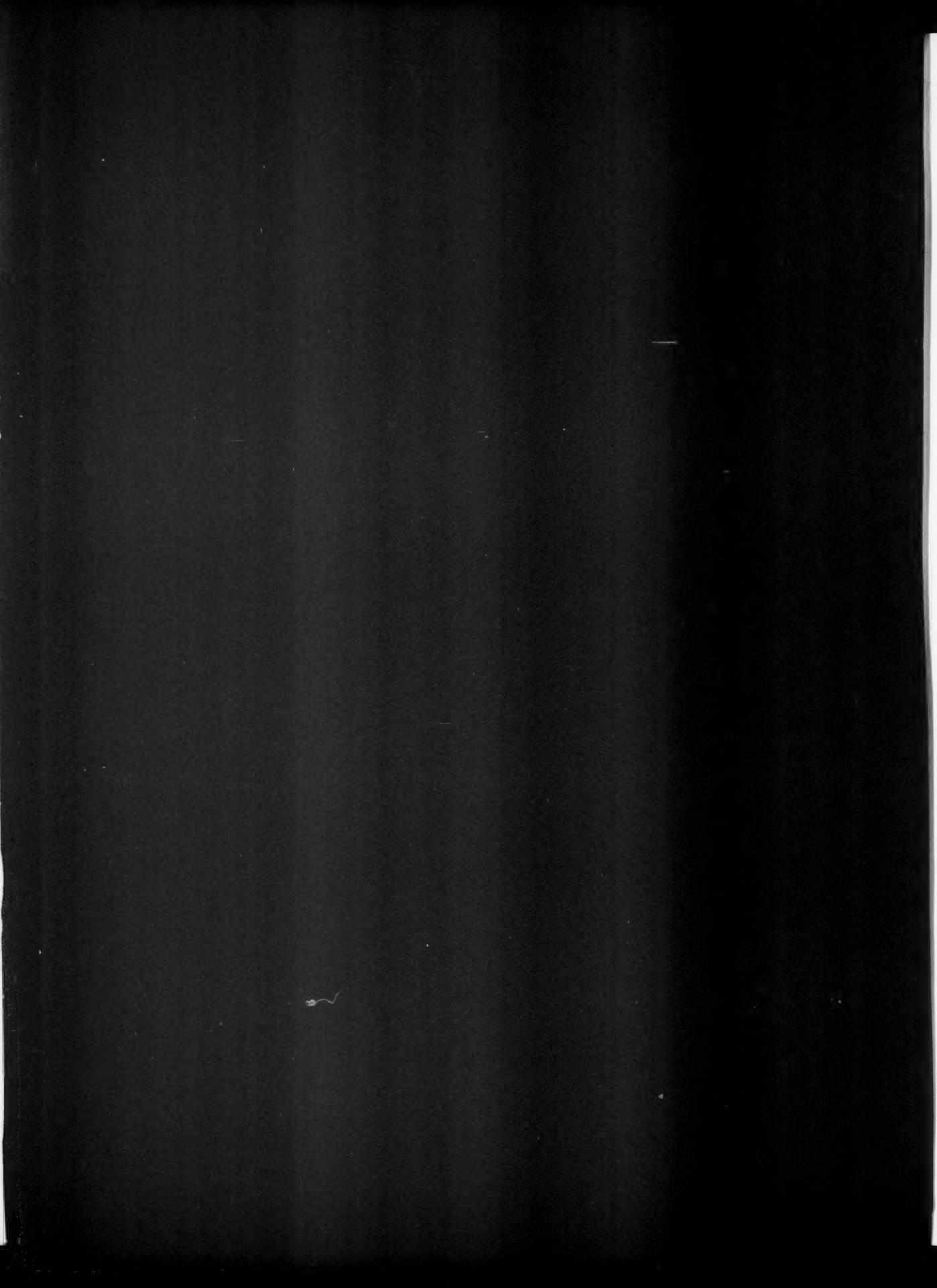
Continued on page 56

NPN Transistors							
2N333	2.5 MHz	45V	25mA	150mW	B = 18	TO-5	—
2N706	320 MHz	25V	10mA	300mW	B = 20	—	—
2N1306 germanium	10 MHz	25V	300mA	150mW	B = 60-300	TO-5	NTE101
2N2222	250 MHz	60V	800mA	500mW	B = 50-120	TO-18	—
2N3055	10 kHz	100V	15A	115W	B = 20-70	TO-3	NTE181
BFR90	5 GHz	15V	—	—	—	—	NTE65
2SA490	1 GHz	30V	—	—	—	TO-72	NTE128
2SC535	800 MHz	35V	—	—	—	TO-92	NTE107
2SC1906	1 GHz	30V	—	—	—	TO-92 ECB	NTE107
PNP Transistors							
2N107 germanium	—	12V	10mA	50mW	B = 19	in-line	—
2N155 germanium	—	30V	3A	1.5W	B = 30	TO-3	—
2N247	30 MHz	35V	10mA	80mW	—	—	—
2N1038 germanium	8 MHz	40V	3A	1W	B = 20-60	—	—
A55	250 MHz	40V	—	—	—	TO-92 EBC	NTE100
A56	550 MHz	30V	—	—	—	TO-92 EBC	NTE160
2SA124	250 MHz	75V	—	—	—	TO-18 EBC	NTE126
FETs							
40600 Ndepl MOS	200 MHz	20V	18mA	400mW	—	5 dBm	MFE122
2N2843 Pdepl MOS	—	30V	2mA	300mW	1.4k μ h	—	—
2N3819 Ndepl MOS	400 MHz	40V	20mA	—	5k μ h	4 dBm	—
2N4416 Ndepl	400 MHz	30V	15mA	310mW	6k μ h	4 dBm 150 rds	TO-72
3N163 Penhan	—	40V	50mA	375mW	250 μ h	250 rds	—

Table 2. Example of data listings for transistors and FETs. The listing contains data pertinent to part identification and general usage.

IC Database	
4011	MOS quad 2-in NAND
4012	MOS dual 4-in NAND
4023	MOS triple 3-in NAND
4049	MOS hex invert
7400	quad 2-in NAND
7410	triple 3-in NAND
7414	hex Schmitt trig/invert
74LS14	hex Schmitt trig/invert
7432	quad 2-in OR
7433	open collector quad 2-in NOR
7442	BCD-DEC decoder
7447	BCD-7 segment decoder
7472	AND-gated J-K master-slave flip-flop
7483	4-bit binary full adder
7490	decade counter
74121	monostable one-shot
74123	dual retrigger mono 10145
74C150	CMOS 1-16 data select
74164	8-bit shift reg

Table 3. Example of an IC data file. Data provides a function reference associated with a part number.



Does Your Junk Box Runneth Over?

continued from page 21

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Table 3. Example of an IC data file. Data provides a function reference associated with a part number.

Does Your Junk Box Runneth Over?

continued from page 55

are worth more to a collector than the financial value of the parts they contain.

Obtaining authentic "cigar boxes" today is a lot more difficult than it was when I was a kid. But available today are pencil boxes that resemble cigar boxes in size and shape. In the Los Angeles area at least, pencil boxes show up on the shelves about one to two months preceding a school year. Whenever I see them, I manage to carry home several because I always have a "need to organize" my stuff in boxes the size of cigar boxes.

In my situation, each cigar box carries a sticky label that identifies the parts contained within. In the case of resistors or capacitors, the label carries a part's value range. Dividing the parts into numbered ranges reduces the "hunting" time required to retrieve a desired part. Of course, separating the resistors and capacitors into wattage size or working voltage increases the number of boxes required and does make it easier to find the "right part" for a project.

With technology driving down component size, small plastic drawers in cabinets provide an excellent storage medium as shown in **Photo D**. Each drawer carries a sticky label that identifies the contents. Because the cabinets are easily stacked, they are very convenient for tight storage spaces.

OK, now that you have your parts organized and you think that you can find them, what part do you need for a project? Let me cite an example of what happened to me once that caused me to consider a refinement to my parts organization. While cleaning up my workbench one day, I picked up a small flashlight bulb — yes, it was a good one and I recognized its application. But what didn't appear in my head was the technical information you would desire to have for that particular light bulb. Was it a 1.2 V, 2.5 V, 3.8 V, or perhaps a 6 V bulb? When I considered the fact that I failed to have the specific data in my head for the bulb I began to realize that I had no

information for other parts such as transistors, ICs, and other small parts that I use in my projects.

Data control

To resolve the issue of readily identifying data for the light bulb, I began to build a database for every light bulb in my possession. A sample of the listing that I developed is shown in **Table 1**. The objective was to provide data that would be desired for use in any application in addition to the application for which it was designed. To make the light bulb listing meaningful, I've included only the pertinent technical data. Of importance to me was the part number, voltage, current, hours of life, bead color (for visual identification), base information, and alternate part number. The alternate part number allows me to obtain the bulb from my local "candy store" should that be necessary.

After completing the light bulb database, I continued to build up data on all of my transistors as shown in **Table 2**. Desired data for transistors follows a similar pattern as that for light bulbs. In most cases, I need to know the part number, maximum operational frequency, collector voltage, current, wattage dissipation, HFE (B), and an equivalent part number. With that information in mind, I can design a circuit using available parts or can easily relate one transistor to another anytime I choose. Being able to compare transistors is helpful when having to select a substitute device while repairing a piece of equipment.

Most transistors available today are processed in silicon or exotic materials, while those made earlier were made using germanium. I've found it interesting to identify and work with germanium devices because of the electrical differences they exhibit. Therefore, it's important to note "germanium" in my listing.

Field-effect transistors have so many unique characteristics that place them into a category of their own. The kind of FET information important to me is shown in the listing example. In addition to the normal voltage, current, and power dissipation, I've attempted to in-

clude the characteristics such as enhancement or depletion mode, micro mhos, noise figure, and saturation resistance that are appropriate for the device.

Table 3 shows a brief listing for IC data. Since available data books carry the technical information you need for a circuit design, my listing objective was to provide functional identification. When designing a circuit out of your junk box, the listing allows specific parts to be selected for the project by function. Specific design data is then obtainable for that part from data book references.

After building up the various databases for parts stored in my junk box, I found a need for organizing the data. As shown in **Photo E**, I have file folders identified for the general type of data contained. Also shown in **Photo E** is a file folder marked *SPEC BOOK INDEX* which contains, in order, the data information shown in the bound books shown in **Photo F**.

An aspect of the database that has helped me is the fact that the only parts that are listed are parts stored in my "junk box." As a result, there is no reason to guess and search for a part, because if it's listed, it's properly filed in my junk box for easy retrieval.

Conclusion

So what's a "junk box" and how can you best make use of one? Perhaps it's a bunch of accumulated trash, or it could be useful ham-related items having a value other than financial, that value being determined by the owner of the items in relation to the knowledge of an application usage. Using a transistor as an example, the value lies in knowing what the device is capable of doing, or how it will respond to a circuit stimulus. The device is useless unless its characteristics are known. Also, is the part contained in the junk box and is it available for use?

Your junk box is really a very personal thing — one that another person may not relate to or evaluate in the same manner as you. How you determine the value of your junk box is really up to you, but one thing's for sure: The better organized it is, the more fun — and valuable — it becomes.

New Life for a Pierson KE-93

continued from page 24

and a mixture of dish detergent and water. Immediately after scrubbing, I wiped off all of the moisture with a paper towel. Although the dirt and grime were removed, the original dark color of the casting remained.

Cleaning the cabinet was much easier, because without electronics it was washed with detergent and rinsed with a garden hose. After drying the cabinet in the sun, I waxed the gray hammertone finish with auto wax and polished it with a soft rag.

Conclusion

Working with the Pierson KE-93 communications receiver was quite an experience for me. The design of the receiver exceeded my anticipated performance criteria that I'd considered normal for tubed receivers of the 1950s era. The narrow bandwidth, low intermod, no identifiable images, and high sensitivity of the receiver were very impressive indeed.

On the downside, however, the compact design, though great for both mobile and base applications, makes the receiver very difficult to troubleshoot and repair. For troubleshooting purposes, a complete schematic would be very helpful, but in the absence of a schematic, I'm hopeful that the information that I've provided will assist you in restoring your own KE-93. **73**

Tesla: Inventor of Radio and Modern-Day AC

continued from page 37

recognized the business advantages of a claim to invention of the products and services he was marketing as a check on his competition. In those days, most monopolies were formed by merging or buying up the competition, or by driving smaller competitors out of business through costly patent litigation where possible. Today, this is referred to by antitrust lawyers as nonprice predation and considered to be a restraint of trade.

For example, Edison had joined The

Gramme Electrical Company in 1882, a group formed expressly not only to fix prices but also to engage in patent litigation against "outside" electric companies (*Electrical Review*, May 15, 1882). The Sherman Act was not enacted until 1890. It outlawed price fixing and other restraints of trade (but by 1890, the business was already pretty well concentrated). In sum, evidence available from historical documents simply does not support Marconi's claim of invention, but shows only a strong incentive for claiming invention.

Marconi's interest in wireless transmission of intelligence did not commence until 1894.

In 1866, an American dentist named Mahlon Loomis showed that one could detect signals between two mountains in Virginia. Loomis applied for and was granted a patent for wireless telegraphy in 1872, some 22 years before Marconi learned of Hertz's experiments.

In 1897, Marconi could only reach a distance of nine miles. Two years later, he sent messages across the English Channel (the English Channel is about 22 miles in width from Dover to Calais) (Bruno, *The Tradition of Technology*, Library of Congress, Washington, 1995, pp. 110, 241).

In contrast, despite a laboratory fire in 1895 that destroyed most of his equipment, less than two years later Tesla was transmitting from his Houston Street laboratory in New York City a distance of 30 miles up the Hudson River to West Point (*Nikola Tesla On His Work With Alternating Currents*, N. Tesla, ed. L.I. Anderson, Sun Publishing, 1992).

Tesla was so confident of his new four-circuit system that in 1899 he wrote a letter to his friend Robert Underwood Johnson proclaiming "how ... absolutely sure I am that I shall transmit a message [across the Atlantic] to the Paris Exposition without wire ...!" (microfilm letter, Tesla to Robert U. Johnson, August 16, 1899, Library of Congress). **73**

CALENDAR EVENTS

continued from page 43

under 12 admitted free with adult admission. Mobile check-ins and directions until noon on 147.315 and 443.225, backup 145.275. Free parking. Handicap facilities available. Outdoor flea market spaces \$2 per 10 ft section. Inside tables \$10 per table, gate admission not included. Dealer/flea market setup at 6:30 a.m. Inside tables guaranteed until 9 a.m. with reservation fee in advance; others first come, first served. Dealer registration with SASE and check or MO payable to: 20/9 Amateur Radio Club, Inc., 55 S. Whitney Ave., Youngstown OH 44509. Payment must be received no later than April 15th. For more info contact Don Stoddard N8LNE, Chairman, 55 S. Whitney Ave., Youngstown OH 44509, tel. 330-793-7072, E-mail [N8LNE1@neo.rr.com]; or Rich Hamaker, Co-Chairman, 4939 E. Radio Rd., Youngstown OH 44515, tel. 330-792-4019. Uniformed and plain clothes security will be present. Alcoholic beverages, fire arms, and questionable or demoralizing materials are not permitted on school property.

GALVA, IL The Area Amateur Radio Operators club will hold the 3rd annual W9YPS/AA9RO Hamfest "ARRO Fest 2002" on April 28th, 8 a.m. to 2 p.m. at the Galva National Guard Armory. Handicap parking and handicap accessible. Excellent parking. Large outside flea market area. Electricity is available inside the building; bring your own extension cords. VE exams by reservation only. The National Guard Auxiliary will provide an All-You-Can-Eat breakfast as well as lunch. Advance tickets are \$5 with three stubs, \$7 at the door with one stub. To reserve tables and tickets, or to receive more info, contact Matt Bullock, 419 E. College St., Kewanee IL 61443, [mbullock@bwsys.net]; or Phil Imes, 908 Zang Ave., Kewanee IL 61443, E-mail [kewphil@cin.net].

MAY 4, 5

ABILENE, TX The Key City ARC will sponsor its 17th annual Hamfest at the Abilene Civic Center from 8 a.m. to 5 p.m. Saturday, and from 9 a.m. to 2 p.m. Sunday. Free parking. VE exams. Wheelchair access. Limited RV parking for a nominal fee. Tables \$7 each. Pre-registration \$7 (must be received by April 29th), \$8 at the door. Talk-in on 146.160/.760. For reservations and info, contact Peg Richard KA4UPA, 1442 Lakeside Dr., Abilene TX 76002, tel. 915-672-8889. E-mail [ka4upa@arrl.net].

MAY 11

RENO, NV The Reno Area Metro Simplex ARC will sponsor the Reno Spring Ham Swap at the KNPB Television Station, 1670 N. Virginia St. (on the campus of the University of Nevada, Reno), from 7 a.m. to 1 p.m. From

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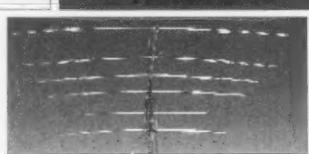
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SPECIAL EVENTS, ETC.

APR 13, 14

GODALMING, SURREY, UNITED KINGDOM

A worldwide radio link-up will be on the air Saturday April 13th and Sunday April 14th, the 90th anniversary of the sinking of the *Titanic*. The link-up is being organized by the *Titanic* Wireless Commemorative Group in cooperation with Godalming Museum, to honor the memory of Jack Phillips, Chief Wireless Telegraphist aboard the *Titanic*. Jack Phillips was 25 years old when he stayed at his post on the *Titanic*, sending out SOS distress signals in Morse code to alert other ships. He saved over 700 lives before he went down with the ship 2 hours and 40 minutes after it struck the iceberg. It was the first time that the SOS message had been sent at sea. The special event commemorative station GB90MGY will be active on CW-only on all amateur short wave bands from 80 to 10 meters (including WARC bands), from 1000 hours GMT Saturday, April 13th, to 0219 hours Monday, April 15th (the precise time when the *Titanic* sank).

problem is further compounded by coverage area. A typical sun-synchronous, low-Earth-orbit (LEO) satellite like MAROC-TUBSAT will be in range of every spot on the Earth several times a day.

AMSAT (The Radio Amateur Satellite Corporation) was established in 1969 as a nonprofit scientific and educational entity tasked primarily with building and operating satellites within the Amateur Satellite Service. Today there are many AMSAT organizations, all working to promote similar goals. The IARU was established in 1925 as a worldwide federation of national amateur radio societies.

AMSAT drafted and approved a document in 1997 called "Background Information for Prospective Owners and Operators of Satellites Utilizing Frequencies Allocated to the Amateur-Satellite Service." The IARU immediately adapted this document for international use. You can find it on the Internet at [<http://www.iaru.org/satellite/prospective.html>]. It is easy to understand and is now the standard for satellite builders.

If the groups behind MAROC-TUBSAT had taken a bit of time to check out information from the IARU or any AMSAT organization, they would have been able to easily avoid their current difficulties. The downlink on 144.1 MHz was not a good choice. In many parts of the world, this frequency is seen as a weak-signal calling frequency. Most educational satellites with two-meter downlinks are coordinated to use 145.825 MHz due to worldwide congestion. More options are available for those with 70-cm downlinks.

What's next?

In the months and years to come, we expect dozens of small satellites to take to the sky on amateur frequencies. Most of these are from educational institutions with strong ham-radio ties. Many have been in contact with the IARU or AMSAT. A few have not, but at least are cognizant of the guidelines available in the IARU document.

One new educational hamsat to watch for is Kolibri, a Russian/Australian project for students at the Ravenswood Girls School and Knox Grammar School in Sydney, Australia, and the Obninsk school system through the Center of Computer Technologies at the Institute of Atomic Power near Moscow, Russia. The small satellite has a primary downlink on 145.825 MHz FM with telemetry and recorded voice. It has been on the International Space Station for a number of months, and was scheduled to be hand-launched in late February or early March, 2002, during a spacewalk. We'll

HAMSATS
continued from page 45

What does it mean?

Our amateur satellite frequency allocations are a very valuable resource. The ITU has specifically set aside 144-146 and 435-438 MHz in the VHF and UHF spectrum for the Amateur Satellite Service as a subset of the Amateur Radio Service. Other allocations also are in place, but the VHF and UHF bands are the most popular. For those that recognize the authority of the ITU, the rules have the status of an International Treaty.

In some countries amateur radio is viewed as a public service, while in others it is seen as an educational resource, a simple hobby, or as a training ground for commercial endeavors. A few countries even treat ham frequencies as just another place to do business regardless of international agreements. The ITU and IARU certainly have their hands full attempting to police the world for spectrum misuse. For satellites the

Special DX Forecast

April is usually favorable for HF communications but I'm predicting that this will turn out to be more the exception than the rule.

Numerous active sunspots will cause erratic propagation conditions throughout the month with fewer good days than one might normally expect. In fact you'll notice that there are only two solidly Good(G) days marked on the calendar with only eight other days listed as Fair to Good (F-G). The dates marked as Poor (P) are very likely to be associated with M and X-class solar flares or CMEs, so expect geomagnetic disturbances to follow within 48 hours if such events occur and are Earth-directed.

There has been a resurgence of sunspot activity since late last year and experts now agree that we are experiencing a second peak in cycle 23. This is not unusual since about a dozen dual peaks have been observed over the last 400 years. What is surprising is that this is the third cycle in a row that we've had one. An interesting pattern that seems to have emerged is that dual peaks occur 15 to 18 months apart, but the reason why is uncertain.

One possibility has to do with changing rotational velocities of gas currents near the base of the "convective zone," the turbulent top third of our sun. This is the region thought to be where most of the sun's magnetic field is generated. Just last year, using a technique called helioseismology, scientists were able to probe the sun's interior and measure these currents speeding up and slowing down about every 16 months. Whether this happens continuously or only during solar maximum is yet to be determined.

Exactly how this might relate to the sunspot cycle and the formation of new sunspots is also unclear. Sunspots themselves are only a minor part of the whole solar picture but obviously the activity associated with them can produce dramatic changes in the Earth's magnetic field. Over the solar cycle these effects have important consequences for the Earth's upper atmosphere and, as we all know, the propagation of high frequency radio waves.

73 until next month ...

April 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
1 P	2 F-P	3 F	4 F-G	5 G	6 G	
7 F-P	8 P	9 F-P	10 F	11 F	12 F-P	13 F
14 F	15 F	16 F-G	17 F-G	18 F-P	19 P	20 F-P
21 F	22 F-G	23 F-P	24 F-G	25 F-G	26 P	27 F-P
28 F-G	29 F-G	30 F				

EASTERN UNITED STATES TO:														
GMW	10	12	14	16	18	20	22	24	26	28	30	32	34	
Central America	(15) 20	(15) 20	20 (40)	x	x	x	(10)	(10)	(10-15)	(10)	(10-15)	10 (17)	10-15	12-20
North America	(17) 20	20 (40)	20 (40)	(20-40)	x	x	x	(10)	(10)	(10)	(10-15)	10-15	10-15	(20)
Western Europe	(20-40)	(30-40)	(30-40)	(40)	x	x	(15-20)	(10-20)	(10)	17	15-20	(15)	20	(20)
Southern Africa	(17) 20	(20-40)	(20)	(20)	x	x	x	x	(10)	(10)	(10)	15 (16)	12 (17)	(15-20)
Eastern Europe	x	(30-40)	(20-40)	(17-20)	(20)	x	x	(10-15)	(15)	(17-20)	(20)	(20)		
Middle East	x	(20)	20	(20-40)	(40)	x	x	x	(10-15)	15	(17-20)	(20)		
India/Pakistan	(17-20)	x	x	x	x	x	x	(15-17)	x	x	x	x	x	x
Far East/Japan	(17-20)	(20)	x	x	x	x	x	x	x	x	x	x	x	(15)
Southeast Asia	(17-20)	x	x	x	x	x	x	(17-20)	(10-15)	x	x	x	x	x
Australia	(15)	(17-20)	x	x	x	x	x	(20-40)	(20)	(20)	(10)	x	x	x
Alaska	(15) 20	(20)	(20-30)	(30-40)	(40)	x	x	x	(15-20)	(10-20)	(10)	17	15-20	
Hawaii	(15) 20	20	(20-40)	(20-40)	(40)	x	x	x	(15-20)	(10-20)	(10)	20	15-20	
Western USA	15-20	20 (40)	20 (40)	(20)	(30-40)	x	x	(10-20)	10 (20)	10 (20)	10 (20)	10 (20)	(15)	20

CENTRAL UNITED STATES TO:														
GMW	10	12	14	16	18	20	22	24	26	28	30	32	34	
Central America	(15-20)	20 (40)	20-40	20-40	20-40	x	(10-20)	10-20	10-20	10 (20)	10 (20)	10 (20)	10 (20)	10-20
South America	(15) 20	17-30	20 (40)	20 (40)	x	x	x	(10-20)	10 (20)	10 (20)	10 (15)	10 (20)	12 (20)	
Western Europe	(20)	(40)	(40)	x	x	x	x	(15)	(15-17)	(15-20)	(17-20)	(20)		
Eastern Africa	20	(20)	(20)	(20)	x	x	x	x	(10)	(10)	(10-15)	(10-17)	(15-20)	
Eastern Europe	(20)	(20)	x	x	x	x	x	(15)	(15-17)	(17-20)	(20)	(20)		
Middle East	x	x	x	x	x	x	x	x	(15)	(15)	(15)	(20)	(20)	
India/Pakistan	(17-20)	(15-20)	x	x	x	x	x	(15-20)	x	x	x	x	x	
Far East/Japan	(17-20)	(20)	x	x	x	x	x	x	x	x	x	x	x	(15)
Southeast Asia	(15-20)	x	x	x	x	x	x	x	(20)	(10-20)	x	x	x	x
Australia	(15) 20	(20)	x	x	x	x	x	(15-20)	(15-20)	15	15	15	15 (20)	
Alaska	15-20	(15) 20	20	(20) (30)	(30-40)	(40)	x	x	x	(10-20)	10-20	10-20	10 (20)	
Hawaii	15-20	(15) 20	20 (40)	(30-40)	(40)	x	x	x	x	(10) 12	10-15	10 (17)		

WESTERN UNITED STATES TO:														
GMW	10	12	14	16	18	20	22	24	26	28	30	32	34	
Central America	10-20	15-20	15-30	(14) 40	20-40	(30-40)	x	(15-20)	10 (20)	10 (20)	10 (20)	10 (20)	10 (20)	10 (20)
South America	(10) 20	(15) 20	20 (40)	20 (40)	x	x	x	(10-20)	10 (20)	10 (15)	10 (15)	10 (20)	10 (20)	
Western Europe	x	x	x	x	x	x	x	x	x	(15-17)	(15-17)	(17-20)	(17-20)	
Southern Africa	(20)	(20)	(20)	(20)	(20)	x	x	x	x	(10-12)	(12) 17	(15-20)		
Eastern Europe	x	x	x	(17-20)	(17-20)	x	x	(15)	(15)	(15-17)	(17-20)	(20)	(20)	
Middle East	x	(20)	(20)	x	x	x	x	x	x	(15-17)	(20)	(20)	(20)	
Far East/Japan	x	(17-20)	x	x	x	x	x	x	x	(15-17)	x	x	x	
Southeast Asia	10-20	(20)	x	x	x	(40)	(40)	x	x	x	x	x	x	(10-20)
Australia	(10-15)	(15)	(17-20)	x	x	x	x	x	x	(15) 20	(15-20)	(15)	(10)	
Alaska	(10) 20	(15) 20	20 (40)	(20) 40	(30-40)	(40)	(40)	(40)	(40)	x	(10-15)	10-15	10-20	
Hawaii	(15) 20	20	(20-40)	(20) 40	(30-40)	(40)	x	x	x	x	(10-20)	10 (20)	10 (20)	15-20
Eastern USA	15-20	20 (40)	20 (40)	(20) 40	(30-40)	x	x	x	x	(10-20)	10 (20)	10 (20)	10 (20)	(15) 20

Table 1. Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.

Band-by-Band Summary

10-12 meters

10 and 12 meters will have already begun to wane and will continue to deteriorate as the weather warms up. Some activity will still be available to the east in the morning and to the west during the afternoon, but the duration of openings will be short. The strongest peaks will usually occur in the afternoon and short-skip distances will fall between 1,000 to 2,200 miles.

15-17 meters

15 and 17 meters will still be fairly workable, but mostly to the Central and South America. Look for a few openings toward Europe before noon, a strong peak to Central and South America around midday, and some weaker activity to the west from late afternoon to mid-evening. Short-skip will average around 1,000 miles.

20 meters

20 meters will be open to most areas of the world and is your best bet for most times and conditions. Peaks occur right after sunrise and again just before sunset. The southern hemisphere will be very active with strong DX signals on good days. Short-skip may vary from 500 up to 2,500 miles depending on conditions.

30-40 meters

These bands should be good choices from late evening until sunrise but atmospheric noise will be higher than last month as the subtropics heat up. The most reliable openings will be to the southern hemisphere but North Africa, the Middle East, and Central Asia may provide some interesting opportunities when conditions allow. Daytime skip will be less than 1,000 miles but nighttime distances will be beyond 700 miles.

80-160 meters

80 and 160 meters will be spotty and can't be relied on because static from tropical storms will be the norm. Have a listen if 40 meters is open but don't expect many stations to come booming in from halfway around the world. Short-skip on 80 meters should average over 2,000 miles at night while skip on 160 will fall between 1,000 and 2,000 miles. If there are any daytime openings at all skip will only operate out to 300 miles or so.

NEVER SAY DIE

continued from page 59

bother with all that anymore. If something stops working they don't fix it, they replace it. They no longer have any need for tech schools. I'm not even sure they bother to fix the stuff when it's replaced. I'll bet we'll find that they just crush the stuff and throw it away. With Congress and the Administration okaying any military budget submitted, why should they worry about economizing?

Our military is spending more today than they did in the 1970s and early 1980s when we were: "fighting communism."

When I was teaching radio school at the submarine base in New London, they had a huge warehouse packed solid with radio, radar, sonar, and test equipment shipped there to be installed on the new submarines that were under construction. When the war ended and new submarine construction was halted, all that brand new stuff was unpacked and crushed. Tens of millions of dollars worth of fabulous equipment. Receivers hams would have given their eye teeth for. Oscilloscopes, General Radio signal generators, and so on. Sure, there was a bunch of war surplus equipment that hit the market, but virtually none of it came from the Navy. They destroyed theirs, apparently because of a secret agreement with the manufacturers not to spoil their postwar sales of new equipment.

I heard about this happening at Navy bases all around the world. In Guam there was a pile of Teletype machines over a hundred feet high that hams would have given anything for. And so on.

The military, with an endless supply of our money, doesn't have to be careful. And it's more practical with today's short, intense wars to replace broken equipment and forget it, so we're not seeing military surplus. Not that most of it would be of much use. The stuff is too specialized today.

So our surplus houses are long gone. We only have a few kit manufacturers. And old-timers grumble about our not making our own equipment anymore as they tune their Icom radios, looking for someone to complain to.

Water

How come I keep stressing the importance of drinking *distilled* water? Don't we need the minerals we can get from our water supply? Dr. Allen Banik, who's spent much of his life researching the effects of water on the human body, says, "The only minerals the body can utilize are the organic minerals (from plants). All other types of minerals are foreign substances to the body and must be eliminated. Distilled water is the only

water that can be taken into the body without damage to the tissues." And Dr. Charles Mayo (Mayo Clinic) says that inorganic minerals in solution are the cause of much human disease.

Are you drinking at least ten glasses of pure water a day? And two glasses for every cup of coffee or tea you drink.

There's a \$119 steam distiller available. See www.steamdistiller.com for the sales pitch.

Windmills

I see where Ireland and UK are starting to install offshore windmills as a way to phase out their coal generating plants. Each will have 200-foot rotors and generate 3 megawatts.

Ireland's wind farm plan is to install two hundred wind turbines four miles at sea in water up to 81 feet deep. This will supply about the same amount of power as a large coal-burning plant. Twenty turbines are expected to be in place by fall this year.

It would take about a million wind turbines to supply America's energy needs, but it sure would cut the cost of electricity and free us from a lot of pollution. It would also help us not to leave a planet stripped of coal and oil for our great grandchildren.

I'd rather see some developmental effort for cold fusion-powered units, where we could use our nuclear waste as fuel, generating heat and electricity while we clean up our nuclear waste storage sites. That would bring us energy at about a tenth of today's cost.

Reincarnation

If you are in denial about reincarnation, it's because you haven't read any books on the subject. Well, it's easy to disbelieve things you know very little about.

I first ran into reincarnation when I was doing Dianetic auditing back in 1950. I found that in quite a few cases, when under hypnosis I asked my patients to go to the first time something traumatic had happened in the past which was causing them problems in their present lives that they went to a death in a previous life. People who'd died by drowning in a past life often had a fear of the water in this one.

I deconditioned the trauma just as I would one in their current life and this always cured their problem.

I've read some excellent books on the subject, including a new one by Tom Shroder, *Old Souls*, from Simon & Schuster, ISBN 0-684-85193-8, 255 pp., 1999, \$12. This is Tom's story of his

Continued on page 62

NEVER SAY DIE

continued from page 61

work with Ian Stevenson, a physician and psychiatrist who has investigated over 2,500 cases of young children who have memories of their previous lives.

In the book Tom takes us through Stevenson's investigation of several children who remembered previous lives. There was one case where as a Lebanese woman died, she promised her husband that she'd be back as soon as she could. A few weeks later a baby girl was born in a village about a hundred miles away. As soon as the baby started to talk she was pleading to go to her village and be with her husband and children. When her parents finally did make the trip with her she was able to name many of the people they met in her old village and point out things from her memories.

The book is interesting, but I won't add it to my *Secret Guide to Wisdom* review of books because I found it too slow-going. Too much travelogue and not enough interesting cases. However, if you want to learn about the reality of reincarnation and past lives, give it a read.

Extinction

Art Bell has interviewed a couple more pretty convincing gloom-and-doomers. It's almost been enough to make me think.

In my *Human Extinction Prophecies* book, I cite Nostradamus' prediction of a soon-to-come pole shift that would move the poles to somewhere over Siberia and South America, wiping out 97% of humans in the process. The old geezer has been right on the money with most of his predictions, so he's got a lot of credibility.

Then we have Edgar Cayce, promising us a similar catastrophe in the near future. And his prophecies have been remarkably accurate too. Hmm. Gee.

Next comes Chet Snow and his *Mass Dreams of the Future*. Chet's team interviewed a couple thousand people under hypnosis about their future lives. More bad news.

Gordon Michael Scallion K1BWC is another well-known prophet. He, too, has been predicting a major calamity. I have his map of the U.S. as he says it will look after the event and it looks remarkably similar to the one Nostradamus drew 400 years ago. I checked with Gordon and he's gotten prepared with a mostly underground home and plenty of emergency power generating equipment. He lives about 40 miles west of me. Both of our locations will, according to his map, be above the new water level. But good-bye to all of our coastal cities.

One of the two new doomers on Art's

show got his story of what's going to happen from someone he contacted psychically 5,000 years in the future. Something came along at around this time and wiped out all of the cities and put what few people were left back into the caveman age. In view of the warming of Antarctica he suggested that the mile-high ice sheet covering much of the continent, which is larger than the U.S., might suddenly slide into the ocean, creating a tidal wave a half mile or more high which would travel at about 500 miles per hour all the way to the North Pole, wiping out everything in its path.

This could, in turn, wobble the planet into a pole shift. A double whammy.

Art's next doomer made a good case for that elusive tenth planet which Zecharia Sitchin found described in ancient records as Nibiru making a comeback in March next year. He says it'll pass between the sun and earth, causing us havoc. And maybe triggering that pole change.

Hmm, maybe it's about time to get a little dug for an underground retreat and put a dome over it. I'll need a solar power system (like Scallion's), plus a propane-powered generator and a big tank (like Scallion's) to provide power for my ham station and computers for a few weeks until the sun comes out again.

Could a major catastrophe wipe out the technology we've developed over the last few hundred years? Well, if we have no coal or oil, we'll have no transportation or communications and no way to refine metals.

This all seems unlikely, but if anything happens, remember that you saw it here. If nothing happens, forget the whole thing.

Home Power

If anything catastrophic does come along, the people who are not living in cities and thus have a better chance of survival are going to need to generate their own power. That comes down to solar and wind power at present. The cost of solar panels has been dropping, making that approach more attractive. But the cost of the batteries and other equipment still makes it an expensive way to go.

A bunch of small windmills, as described in the December 2001 issue, is another practical approach.

Ken West KC7TRM E-mailed me another approach which could be developed to harness the sun's power. This was developed by John Mountain, but never commercialized. It uses a bunch of Fresnel lenses to concentrate the sun's rays onto some pipes filled with a liquid which can be heated to 600° or so and stored in a well insulated tank below the

ground. A heat exchanger can deliver the heat to a home via steam, as well as use the steam to drive a turbine to generate electricity to keep storage batteries charged. This would require a space about six by twelve feet, considerably less than a solar array. And could be less expensive. Anyone interested?

Hydrogen

It's a dangerous fuel, but so is gasoline and kerosene — as used in the WTC attack. But if the "war on terrorism" starts jacking up oil prices, as seems likely, we're going to be looking for practical alternatives.

Hydrogen is easy to make — just separate it from the oxygen in water, save the hydrogen and let the oxygen into the atmosphere. We could use a few extra billion tons of oxygen a day for a long time to come.

But it takes energy to make hydrogen. Big deal, we've got boundless energy available from Mother Nature (a.k.a. God). Where? All around us. Like the action of ocean waves, which can be used with floats to turn electric turbines. Tidal flows, some very strong, can be harnessed. A million undersea volcanoes are releasing incredible amounts of heat. Ditto those heat vents all along the midocean tectonic plate edges.

As long as oil was cheap, and the oil companies in firm lobbyist control of Congress and the White House, there was little interest (money) in developing competing technologies. Some \$4.99 prices or long lines again at gas stations and we might see more public unrest with the status quo.

Will we eventually be seeing cars with hydrogen bottles for fuel? Will we see fuel stations selling refilled hydrogen bottles? How many bottles will it take to go, say, 300 miles? As a scuba diver in an hour I pretty well use up a tank filled with 3,000 pounds of air. And those aluminum scuba tanks are heavy to lift.

Well, if it's impractical for cars, maybe hydrogen trucks can refill our home tanks.

Fired!

As the recession continues, with our larger companies laying off thousands of employees (I almost said workers), there's an upside for the survivors and a "what in the hell am I going to do now?" sudden shock for the downsized.

The midlevel survivors are moving up to top-level jobs. The lower-level survivors are finding themselves having to do the work that two or three did before. This should not be difficult.

Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

The Secret Guide to Health: Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or dodgering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

The Secret Guide to Wealth: Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

The Secret Guide to Wisdom: This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

The Bioelectrifier Handbook: This explains how to build or buy (\$15) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

My WWII Submarine Adventures: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about

the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

Wayne's Caribbean Adventures: My super budget travel stories - where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

Cold Fusion Overview: This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

Cold Fusion Journal: They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

Julian Schwinger: A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

Dowsing: Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

Improving State Government: Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy *any* taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

Mankind's Extinction Predictions: If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. I explain the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts—like Hapgood, Einstein, Snow, Noone, Felix, Strieber. \$5 (#31)

Moondogger: After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with readers who worked for

NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

Classical Music Guide: A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! \$5 (#33)

The Radar Coverup: Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

Three Gatto Talks: A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system—the least effective and most expensive in the world. \$5 (#35)

Aspartame: a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

\$1 Million Sales Video: The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

Reprints of My Editorials from 73: Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

1996 Editorials: 120 pages, 100 choice editorials. \$10 (#72)

1997 Editorials: 148 fun-packed pages, 216 editorials. \$10 (#74)

1998 Editorials: 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

1999 Editorials: 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

2000 Editorials: 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

Silver Wire: With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

Silver Colloid Reprint: April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

Colloid Kit: Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99).

Wayne's Bell Saver Kit: The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

73 Writer's Guide: It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

Cold Fusion Six-Pack: Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

NASA Mooned America: René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

Last Skeptic of Science: This is René's book where he debunks a bunch of accepted scientific beliefs—such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

Dark Moon: 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

Dark Moon Video: 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had to have been faked. \$46 (#93)

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So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

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NEVER SAY DIE

continued from page 62

The recession has been accelerated by consumer panic over the terrorist attack on the World Trade Center. They're not sure what this means, so they're sitting at home watching for more anthrax cases and the continuing coverage of the WTC mess. What they're not doing is buying or traveling. They're not spending money. And that's hurting business on all levels.

Job survivors are no longer complacent about their jobs. What if the recession continues? How long will it be before the ax swings again and their head is staring up blankly from the basket?

If you've been reading my essays for long you know what my advice to both the downsized and the potentially downsized is. Start your own business.

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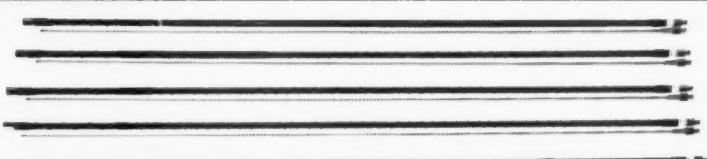
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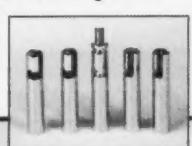


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● **WIDE CHOICE OF POWER SOURCES:** The FT-817 is equipped with an alkaline "AA" cell battery case, and a 13.8 volt DC cable is also supplied. Available as an option is the FNB-72 Ni-Cd Battery Pack (9.6 V, 1000 mAh), which can be recharged using a 13.8 Volt power supply while the radio is being operated.

● **TWO ANTENNA PORTS:** A "BNC" connector is provided on the front panel, and a type "M" connector on the rear panel, with Menu selection of which connector will be assigned for operation on HF, 50 MHz, 144 MHz, and 430 MHz.

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